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Brief communication

Influenza in Yucatan in 2018: Chronology, characteristics and outcomes of ambulatory and hospitalized patients

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A R T I C L E   I N F O

A B S T R A C T

Introduction: Influenza season is expected between October and February in the northern hemisphere, including Mexico. Previous studies suggested that transmission peak may occur earlier in Yucatan, a state in southeast Mexico.

Objectives: (a) Describe the seasonality of 2018 influenza cases seen at OHoran hospital, statewide, and nationwide; (b) analyze the characteristics, clinical manifestations and outcomes of ambulatory and hospitalized patients; (c) analyze fatal outcomes occurrence among vaccinated and unvaccinated individuals.

Methods: Retrospective analytic cohort of all confirmed influenza cases assisted at OHoran hospital during 2018, along with a chronologic graphic description of the statewide epidemic curve from the epidemiological surveillance registries.

Results: A total of 264 influenza cases were analyzed; 145 (55%) were female; 26% were vaccinated. Health workers and unvaccinated individuals were more prone to develop severe cases. Dyspnea and tachypnea were strong predictors of hospitalization; headache, myalgias, arthralgias and rhinorrhea correlated inversely. 236 (89.47%) cases occurred in July and 22 of the 23 deaths occurred before October. No fatal outcomes were observed among vaccinated individuals. Influenza AH1N1 represented 83.6% of serotyped cases.

Discussion: Onset of influenza season in Yucatan may reflect a need for rethinking timing of vaccination and of preventive campaigns, as most cases occurred before vaccination period.

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Introduction

Every year, almost 15% of the world population becomes infected with influenza, resulting in deaths worldwide. Influenza surveillance is sentinel-type in Mexico, meaning that it is aimed to detect the occurrence and onset of cases, along with identifying any new circulating viral strains. In general, clinical specimens of hospitalized patients are laboratory-confirmed and randomly serotyped. For ambulatory cases, samples are analyzed depending on the available resources. Samples are processed at State Public Health Laboratories with standardized techniques and quality control. When an epidemic is declared, all health units are urged to report cases (even if unsampled) and to emphasize in identifying severe cases to be hospitalized. 2018 was declared as an epidemic year. Even when the influenza season is expected to happen between October and February in the northern hemisphere, including Mexico, where vaccination period starts in October. Previous studies suggested that transmission peak may occur earlier in Yucatan.[1–4]

Chronology of non-severe, hospitalized and fatal cases has not yet been reported for the region, nor are the signs and symptoms presented in-patients or out-patients. Updating the chronological presentation, sociodemographic characteristics, clinical manifestations, antecedents of vaccination, and main outcomes among hospitalized and ambulatory patients could provide relevant information for preventive purposes.

The aims of the present communication was to (a) Describe the chronology of 2018 influenza cases from OH́oran General Hospital, statewide, and nationwide; (b) analyze the characteristics, clinical manifestations and outcomes of ambulatory and hospitalized patients; and (c) analyze fatal outcomes among vaccinated and unvaccinated individuals.

Methods

This retrospective-cohort study is based on the epidemiologic case reports of all patients who were clinically diagnosed with influenza at OH́oran General Hospital in 2018. For each patient, the standardized, unified, epidemiological case report form including clinical manifestations was reviewed. Case report forms, laboratory results and clinical outcomes at discharge of all hospitalized patients were identified with the international classification of diseases under code J10. Ambulatory cases were monitored and recorded. All cases were anonymized, coded in a spreadsheet then transformed into variables using *Stata*14 software for descriptive statistics and association measures (Odds Ratio); results were considered statistically significant when *p*-value <0.05; *post hoc* goodness of fit Hosmer-Lemeshow was performed.

The annual influenza cases distribution for the studied hospital, the state, and nationwide were grouped by month of onset of symptoms. Timing of onset of O' Horan General Hospital cases was derived from case report forms, while statewide and nationwide cases were retrieved from an open-access platform of the Board of Health Department for Access to Health Information and the department of Epidemiological Surveillance.

Results

For 2018, in the state of Yucatan, 6719 ambulatory cases and 480 severe cases were reported. Of those, 264 were assisted at OH́oran General Hospital, where ambulatory patients represented 61.7% (n = 164), 145 (55%) women, 11 (7%) pregnant, mean age 27.1 years, 46 (27.42) health workers. A total of 40 (26.85%) ambulatory and 9 (6.21%) hospitalized patients were vaccinated between October 2017 and January 2018.

Health workers and unvaccinated individuals were more prone to have a severe course of the infection. Clinical manifestations among ambulatory and hospitalized patients varied; while dyspnea and tachypnea (Table 1) were strong predictors of hospitalization, headache, myalgias, arthralgias and rhinorrhea correlated inversely.

Of 62 serotyped samples, one was hemolyzed; 51 (83.6%) were type AH1N1, 7 (11.47%) were influenza B (one Victoria, six Yamagata) and 3 (4.9%) were unspecified Influenza A. In addition, 19 (82.6%) deaths were associated with AH1N1.

At O'Horan General Hospital, during 2018, 236 (89.47%) cases occurred before October. Due to influenza, 23 (8.27%) patients died, of whom 22 died before October (Fig. 1). All fatal cases occurred in unvaccinated individuals.

Chronology of cases occurrence at the hospital coincided with the state transmission for 2018 (Fig. 1) but different from the national trend. An additional figure provides a 10-year chronological distribution of cases.

Discussion

Influenza infection became the first pandemic in the 21 st century, to show seasonal patterns.[1–3] The observed pattern at OH́oran General Hospital in 2018 is congruent with the earlier yearly seasonality in Yucatan.[4] In addition, the present study adds that almost 90% of the ambulatory influenza cases and hospitalizations occurred even before the seasonal vaccination started and that 22 out of the 23 fatalities occurred before the expected season onset. Previous studies from Yucatan had emphasized that vaccination should start earlier.[4] Grohskopf et al. recommended early vaccination for regions with earlier timing of influenza season, always considering that waning would also decrease earlier,[5] but as Yucatan historical data show that incidence is unlikely to increase in January-February,[6] implementing an earlier vaccination in Yucatan seems to be a reasonable preventive strategy. Previous season vaccination may have been protective in severe hospitalized cases, as none of them died.

Influenza AH1N1 was the most common type associated with mortality, which is consistent with previous findings,[7] but contrary to a recent study from Tekin et al., in which AH3N2 was related with more fatal cases.[8] We observed that the presence of influenza signs and symptoms varied, although headache did not correlate with hospitalization.[9] The association between dyspnea and tachypnea with hospitalization has been previously reported in other series.[9,10] In conclusion, yearly season of influenza cases in Yucatan may reflect a need for implementing specific preventive strategies and even though no vaccinated individual with a severe case

Table 1 – Signs and symptoms among hospitalized and ambulatory patients diagnosed with influenza in 2018 at OĤoran Hospital in Yucatan, Mexico (N = 264).

Characteristics	General Population frequency/mean			General Population Percentage		Hospitalization	Adjusted (Pseudo R2 = 0.4713)			Hospitalization	Unadjusted		
	Hospitalized	Ambulatory	Total/ Average	Hospitalized (N = 145)	Ambulatory (N = 149)	ODDS RATIO	Stdandard Error	z	p-value	ODDS RATIO	Stdandard Error	z	p-value
Male	59	60	119	39.60	41.38	1.02	0.01	1.80	0.07	1.56	0.39	1.78	0.075
Age	27	28	27	27.22	26.98	1.07	0.31	0.22	0.82	1.00	0.01	0.21	0.831
Pregnancy	7	4	11	4.83	2.68	6.67	5.37	2.35	0.02	2.35	1.50	1.34	0.182
Indigenous Ethnicity	7	3	10	4.83	2.01	1.32	1.04	0.35	0.73	3.15	2.21	1.64	0.102
Health Worker	5	41	46	3.45	27.52	1.33	0.08	4.89	0.00	1.31	0.06	5.42	0.000
Vaccinated	9	40	49	6.21	26.85	0.17	0.08	−3.90	0.00	0.23	0.09	−3.72	0.000
Pediatric	47	45	92	32.41	30.20	1.90	1.05	1.17	0.24	1.40	0.36	1.28	0.200
Fever	112	147	259	97.30	98.60	0.36	0.44	−0.83	0.406	0.51	0.47	−0.74	0.462
Cough	135	111	246	96.50	90.60	4.92	4.41	1.78	0.075	2.88	1.67	1.82	0.069
Odynophagia	64	99	163	58.10	66.40	1.33	0.58	0.65	0.515	0.65	0.17	−1.70	0.089
Dyspnea	102	75	177	90.20	50.30	4.33	1.98	3.20	0.001	8.39	2.91	6.14	0.000
Irritability	67	88	155	58.70	59.00	0.46	0.19	−1.89	0.059	0.99	0.25	−0.05	0.962
Diarrhea	14	33	47	12.20	22.10	0.56	0.26	−1.28	0.202	0.49	0.17	−2.04	0.041
Chest pain	53	60	113	45.90	40.50	1.46	0.63	0.86	0.389	1.27	0.32	0.95	0.344
Chills	57	90	147	51.80	60.80	0.66	0.31	−0.90	0.368	0.64	0.16	−1.75	0.079
Headache	85	134	219	75.00	89.90	0.32	0.18	−2.02	0.044	0.32	0.11	−3.33	0.001
Myalgias	65	122	187	61.50	82.40	0.46	0.29	−1.23	0.219	0.29	0.08	−4.39	0.000
Arthralgia	60	112	172	57.10	75.60	0.49	0.29	−1.22	0.223	0.36	0.10	−3.84	0.000
Malaise	106	131	237	92.10	87.90	3.86	2.56	2.04	0.042	1.62	0.69	1.12	0.261
Rhinorrhea	84	129	213	73.60	86.50	0.23	0.12	−2.91	0.004	0.42	0.13	−2.72	0.007
Tachypnea	85	33	121	74.50	24.10	8.69	3.65	5.15	0.000	8.89	2.54	7.64	0.000
Vomit	22	32	54	20.00	21.60	0.41	0.19	−1.89	0.059	0.86	0.27	−0.50	0.620
Abdominal pain	22	29	51	20.70	19.40	1.75	0.85	1.16	0.248	0.98	0.31	−0.07	0.946
Conjunctivitis	28.00	42.00	70	25.00	28.10	0.73	0.30	−0.75	0.451	0.82	0.23	−0.70	0.484
A type H1N1	47	4	51	35.17	23.61	5.88	5.94	1.75	0.080	2.94	2.78	1.14	0.255
A (unspecified)	3	0	3	2.07	1.39								0.920
B Yamagata	4	2	6	4.14	2.78								0.777
B Victoria	1	0	1	0.69	0.46								0.980

Deaths reported among influenza patients according to vaccination status

Deaths	General population frequency			General Population Percentage		Adjusted				Unadjusted			
	Hospitalized	Ambulatory	Total	Hospitalized	Ambulatory	Death Odds Ratio	Stdandard Error	z	p-value	Death Odds Ratio	Stdandard Error	z	p-value
Unvaccinated	21	1	22	95.45	1.05	12.84	15.18	2.16	0.031	31.16	32.19	3.33	0.001
Vaccinated	0	0	0	No observations									

Post hoc Hosmer Lewenshow p = 0.930

Monthly distribution of influenza cases in Mexico (N=61,484) and in Yucatan red in Yucatan (N=6719) in 2018. Cases and deaths occurring at the O´Horan Hospital, Yucatan are also presented.

- Percentage of cases assisted at O´Horan Hospital by month of occurrence
- Percentage of deaths occurred at O´Horan Hospital by month of occurrence
- Percentage of cases by month of occurrence, in the state of Yucatan
- Percentage of cases by month of occurrence, nationwide in Mexico (excluding Yucatan)
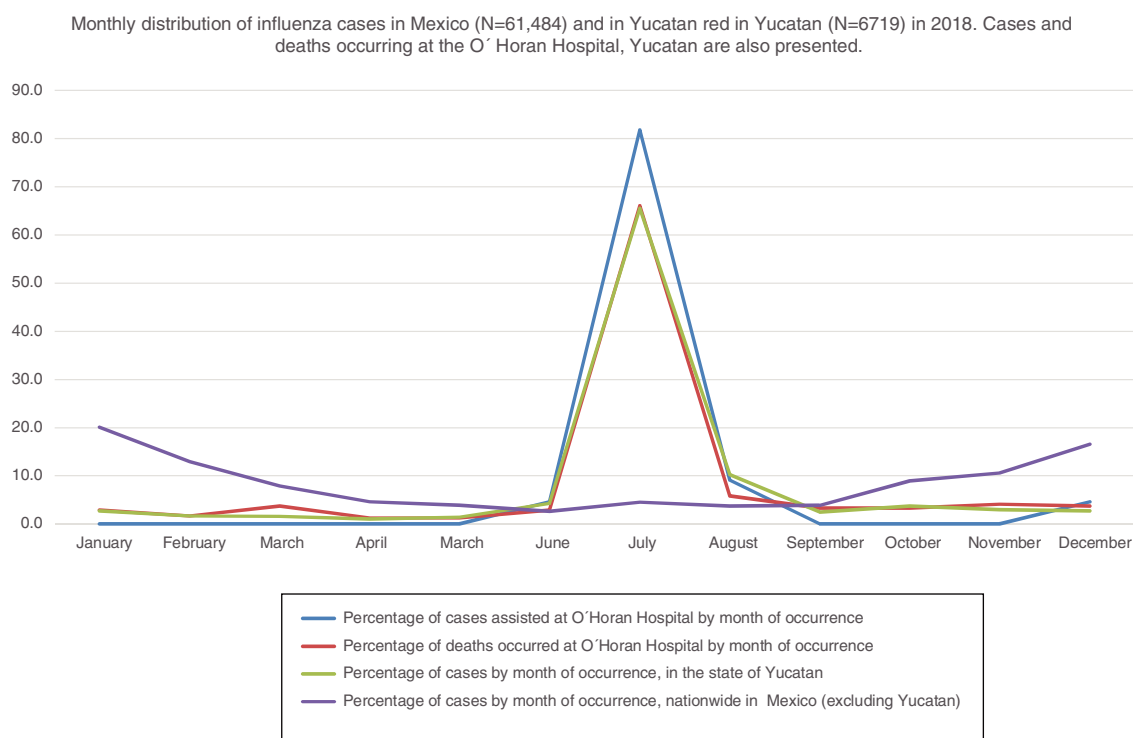
Fig. 1 – Monthly distribution of influenza cases in Mexico (N = 61,484) and in Yucatan red in Yucatan (N = 6719) in 2018. Cases and deaths occurring at the OH́oran Hospital, Yucatan are also presented. National and Yucatan cases source: Open Access Epidemiologic Surveillance system documents accessed from the Board of Health Departments for Access to Health Information.

died in the present series, fatal cases occurred even before the time when the season (and vaccination) was expected to start.

Conflict of interest

The authors declare that there is no conflict of interest.

Appendix A. Supplementary data

Supplementary material related to this article can be found, in the online version, at doi:https://doi.org/10.1016/j.bjid.2019.08.009.

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