Factors associated with hospitalization for seasonal influenza in Morocco

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Abstract

Background: Morocco is actively working towards expanding its influenza vaccine policy to cover high-risk groups, as recommended by the World Health Organization (WHO).

Aims: We assessed the risk factors for influenza-associated hospitalization for severe acute respiratory infections (SARI) that occurred during the last 5 seasons.

Methods: We conducted a retrospective, analytical study among patients recruited in the ambulatory and hospital sites of the influenza sentinel surveillance system in Morocco between 2014 and 2019. Using multiple logistic regression, we compared the characteristics of influenza-positive patients with SARI to those with influenza-like illness (ILI) to identify factors associated with severe disease.

Results: We included 1323 positive influenza patients with either SARI (41.7%) or ILI diagnosis (58.3%). A(H1N1)pdm09, A(H3N2) and influenza B, respectively, contributed 49.2%, 29.5% and 20.6% of the cases. The main risk factors considered in the bivariate analysis were found in the multivariate analysis to be significantly associated with influenza-related hospitalization (SARI): age < 2 years (aOR = 7.08, $P < 0.001$); age ≥ 65 years (aOR = 3.59, $P < 0.001$); diabetes (aOR = 1.98, $P = 0.017$); obesity (aOR = 2.94, $P = 0.034$); asthma or chronic respiratory disease (aOR = 4.99, $P < 0.001$); chronic renal failure (aOR = 4.74, $P = 0.005$); pregnancy (aOR = 7.49, $P < 0.001$); and the A(H1N1)pdm09 subtype (aOR = 1.82, $P < 0.001$).

Conclusion: This study provides epidemiological evidence for the expected benefit of an influenza vaccination strategy for high-risk groups as recommended by the WHO.

Keywords: influenza vaccine, policy, hospitalization, high-risk groups, Morocco

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Introduction

Seasonal influenza is a contagious acute respiratory infection that usually progresses as a benign influenza-like illness (ILI) caused by influenza viruses, usually A or B types, which circulate in all parts of the world (*1*). The influenza A virus subtype H1N1 (A/H1N1pdm09) caused a flu pandemic in 2009. It has become seasonal after the world community developed a certain level of immunity. Since then the usual shift of influenza strains has ensued. The severity of H1N1pdm09 has remained stable (*2*). While H3N2 is more likely to cause severe disease among the elderly and the very young, H1N1pdm09 continues to affect the middle aged group more.

Seasonal influenza epidemics result in considerable annual morbidity and mortality as influenza affects 5–15% of the world population each year, with an estimated 291 243 to 645 832 deaths per year (*3*). Hospitalization and deaths mainly occur in high-risk groups due to severe infection. In terms of social costs, substantial economic losses due to absenteeism, lost wages and increased utilization of health care services are associated with these seasonal epidemics (*4*). Since the 1960s, the World Health Organization (WHO) has produced numerous resolutions and recommendations and invited Member States to strengthen active influenza surveillance and vaccination programmes, particularly for specific risk groups (*5–8*). However, many countries around the world continue to have low immunization rates due to limited resources or scepticism about vaccine efficacy (*9–11*).

In Morocco, virological influenza surveillance started in 1995 through a network of volunteer private practitioners aiming to monitor ILI activity. In 2007, ILI and severe acute respiratory infection (SARI) surveillance was established in the public sector in 14 of the 16 regions of the country as part of the pandemic influenza preparedness activities with the support of the United States Centers for Disease Control and Prevention (US-CDC) (*12*). In 2014, surveillance was reduced to 8 sentinel sites for sustainability reasons (*13*).

The seasonal influenza vaccine, which was incorporated into the influenza immunization strategy in Morocco, has been provided to healthcare personnel since 2006 as part of preparedness against the avian influenza pandemic. In 2013, Morocco worked actively on expanding its influenza vaccine policy as part of a cooperative agreement with the US-CDC. Pilot influenza vaccination and communication campaigns, as well as field epidemiologic and knowledge, attitude and practice studies, were carried out as advocacy activities for the National Immunization Technical Advisory Group. Ultimately, the national plan for influenza prevention and control was established by the Ministry of Health with an official vaccination strategy in the 2019/2020 season.

The aim of this study was to assess the risk factors for influenza-associated SARI hospitalization that occurred from 2015 to 2019.

Methods

Study design

This was a retrospective analytical study based on surveillance of ILI and SARI data during the period 2015–2019.

Study sample

The sample comprised all 1323 positive influenza patients recruited and sampled as SARI or ILI during the study period. Eligible cases were hospitalized persons who met the SARI case definition and had influenza A or B detected by polymerase chain reaction (PCR) during 2015–2019. The comparison group was outpatients consulting for ILI in sentinel primary health centres where they were randomly selected to have an oropharyngeal sample taken and were confirmed by PCR as having influenza A or B during the same period.

Study sites

The study was conducted in 16 sentinel ambulatory and hospital sites, comprising 8 of the 2126 primary health centres, 2 of the 5 university hospitals (Rabat and Fez) and 6 of the 12 regional public hospitals (Tangiers, Marrakech, Meknes, Beni Mellal, Oujda and Agadir). A network of private medical practitioners also contributed to patient recruitment. The overall network of virological influenza surveillance is deployed in 8 of the 12 administrative regions of Morocco with nearly 72.3% of the total population estimated at 33 848 242 according to the 2014 national census (http://rgphentableaux.hcp.ma/). The number of samples increased from 239 during the 2014/2015 season and to 2304 during the 2018/2019 season with an annual average of 61.1% SARI and 38.9% ILI.

Case definitions

We used the WHO recommendations for this purpose (*14*). Severe acute respiratory infection is identified where a person has an acute respiratory infection that includes: fever or a history of fever ≥ 38°C; cough; onset of the disease in the last 10 days; and requiring hospitalization. According to the national influenza technical committee, and based on an epidemiologic study carried out at the Morocco University Hospital of Rabat, 54.5% of 28 influenza positive patients admitted to the intensive care unit from July 2014 to August 2016 did not develop a fever even if they had a viral infection due to metabolic and immune disorders (*15*). Therefore, all infectious diseases of the respiratory system with comorbidity were considered for recruitment purposes as meeting the case definition despite the absence of fever (*16*).

Influenza-like illness is an acute respiratory infection that includes: fever measuring ≥ 38°C; cough; and the beginning of the disease in the last 10 days (*16*).

Data collection

Specimens were collected via nasal and pharyngeal sampling between September and June during each flu season. The cases of SARI were randomly recruited and sampled after admission to paediatric, pulmonary, medical and emergency wards or intensive care units as well as to the maternity wards of the sentinel hospital sites. For the paediatric departments, recruitment of SARI cases was done at the rate of 10 cases per day (5 cases under 2 years old and 5 cases over 2 years old). For non-paediatric services, collection of the maximum number of SARI cases was recommended. The ILI cases were randomly sampled in sentinel primary health centres at a rate of no more than 5 samples per day. A questionnaire was completed with patient identification, clinical and epidemiological data, including vaccination; evidence of travel or similar cases in the surrounding area; results of virological analysis; and information on the patient's progress, particularly death during hospitalization.

Laboratory testing

Molecular investigations were processed at the National Influenza Center, National Institute of Hygiene in Rabat. They were performed using qRT-PCR to detect influenza A or B and to establish viral subtyping. Viral RNA was extracted from 400 µl of nasopharyngeal swabs using an automated method with magnetic bead technology performed using the iPrepPureLink, total RNA and Trisol Plus kits (Invitrogen, Thermo Fisher Scientific, Waltham, Massachusetts). The RNA was eluted in a final volume of 100 µl. The qRTPCR was performed using a monoplex assay developed by the US CDC using the SuperScript (RT/TaqPlatinium). Cycling was performed on the Applied Biosystems 7500 Fast Platform (Applied Biosystems, Thermo Fisher Scientific, Waltham, Massachusetts). The fluorescent signal was collected, and data were analysed using the Applied Biosystems software.

Statistical analysis

Descriptive and analytical assessments were carried out using *EpiInfo*, version 7 and *SPSS*, version 19 software. Demographic, clinical and virological characteristics were hypothesized as risk factors for SARI hospitalization.

In univariate analysis, we compared the proportions of those characteristics among SARI and ILI cases using the χ^2 test or Fisher's exact test as necessary. In the multivariable analysis, those independent risk factors for SARI hospitalization considered as the outcome were assessed through logistic regression using 1251 positive cases with no missing information. All variables with a univariate significance level of $P < 0.05$ were selected for inclusion in the base model.

Ethical considerations

The sentinel virological surveillance system for influenza is a public health activity established by the Ministry of Health in Morocco through well-established regulation. As a result, no request for authorization from the National Ethics Committees was required according to the Moroccan regulations.

Results

During October 2014–March 2019, a total of 1323 influenza-positive cases were reported by the sentinel system for influenza virological surveillance in Morocco. The sex ratio was 0.88:1 men to women. The records showed that 171 (12.9%) were under 2 years, 300 (22.7%) were aged 2–14 years, 651 (49.2%) were aged 15–64 years and 129 (9.8%) were aged ≥ 65 years.

Testing indicated that a total of 651 (49.2%) patients were infected with A(H1N1)pdm09, 390 (29.5%) with influenza A(H3N2) and 273 (20.6%) with influenza B (Table 1). The remaining 9 influenza-positive cases were A not subtyped. A(H1N1)pdm09 was the dominant subtype among case-patients during the 2015–2016 and 2018–2019 seasons. Influenza A(H3N2) was dominant during 2016–2017 season and influenza B during the 2014–2015 and 2017–2018 seasons. We noted a substantial contribution from influenza A(H3N2) infection during the influenza B-dominant 2017–2018 season (Figure 1, Table 1).

Among the confirmed influenza cases, regardless of type and subtype, 552 (41.7%) were hospitalized SARI cases and 771 (58.3%) were outpatients with ILI. From the bivariate analysis, extreme age and comorbidity were identified in a significantly higher proportion of the hospitalized SARI cases than among the ILI ambulatory patients: 24.4% versus 6.5% for age under 2 years; 17.2% versus 5.7% for age ≥ 65 years; 10.9% versus 3.9% for diabetes; 14.5% versus 3.4% for asthma or chronic respiratory disease; 7.4% versus 2.5% for chronic heart disease; 3.3% versus 0.6% for chronic renal failure; 1.8% versus 0.1% for chronic neurologic disease; 2.2% versus 0.0% for chronic hematologic disease and 14.5% versus 2.6% for pregnancy (Table 1). Considering the distribution of virus types and subtypes according to clinical syndrome, we found significantly higher proportions of A (H1N1)pdm09 in SARI cases and of A(H3N2) and B in ILI cases ($P = 10^{-6}$). The proportion of patients with cases in the surrounding area was significantly higher in ILI cases, than in SARI cases (33.7% versus 9.2%) (Table 2).

The main risk factors considered in the bivariate analysis were found in the multivariable analysis by logistic regression to be significantly associated with influenza-related hospitalization (SARI): age under 2 years (aOR = 7.08, 95% CI: 4.72–10.63, $P < 0.001$); age of 65 years and more (aOR = 3.59, 95% CI: 2.29– 5.67, $P < 0.001$); diabetes (aOR = 1.98, 95% CI: 1.13–3.49, $P = 0.017$); obesity (aOR = 2.94, 95% CI: 1.08–7.99, $P = 0.034$); asthma or chronic respiratory disease (aOR = 4.99, 95% CI: 2.97–8.38, $P < 0.001$); chronic renal failure (aOR = 4.74, 95%CI = 1.59–14.04, $P = 0.005$); chronic neurological disease (aOR = 10.48, 95% CI: 1.24–88.58, $P = 0.031$) as well as pregnancy (aOR = 7.49, 95% CI: 3.58–15.69, $P < 0.001$) (Table 2).

The A(H1N1)pdm09 subtype was a significant risk factor for influenza-positive SARI-associated hospitalization (aOR = 1.82, 95% CI: 1.39– 2.38, $P <$ 0.001). In contrast, the existence of cases in the surrounding area appeared to be a preventive factor (aOR = 0.22, 95% CI: 0.15–0.31, $P < < 0.001$) (Table 2). Age 2–14 years, chronic heart disease and chronic hematologic disease were not statistically significant in the multivariable analysis. The model fit the data well according to the Hosmer–Lemeshow goodness-of-fit test ($\chi^2 = 8.12$, df = 7, $P = 0.32$).

Discussion

At the international level and in the countries of the Eastern Mediterranean Region (17), influenza seasons have an important impact on human morbidity and mortality each year, in particular on account of the additional burden of hospital admissions each winter. The association of influenza virus types and subtypes with disease severity has been a significant research issue over the past few years, and the issue is of

Table 1 Distribution of influenza infection according to subtype and season, Morocco, 2014–2019

Influenza subtype	Season					
	2014/2015	2015/2016	2016/2017	2017/2018	2018/2019	All
	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)
A (H1N1)pdm09	17 (20.2)	122 (70.9)	0 (0.0)	42 (16.5)	470 (69.8)	651 (49.2)
A (H3N2)	6 (7.1)	30 (17.4)	84 (60.4)	79 (31.0)	191 (28.4)	390 (29.5)
A (not subtyped)	3 (3.6)	0 (0.0)	0 (0.0)	0 (0.0)	6 (0.9)	9 (0.7)
B	58 (69.0)	20 (11.6)	55 (39.6)	134 (52.5)	6 (0.9)	273 (20.6)
Total	84 (100.0)	172 (100.0)	139 (100.0)	255 (100.0)	673 (100.0)	1323 (100.0)

Table 2 Risk factors for hospitalization due to influenza-associated severe acute respiratory infection among 1323 positive cases and controls, 2014–2019 seasons, Morocco

Variable	Influenza-associated SARI (*n* = 552)		Influenza-associated ILI (*n* = 771)		Univariate analysis			Multivariate analysis		
	No.	%	No.	%	Crude OR	95% CI	*P*-value	Adjusted OR	95% CI	*P*-value
Sex										
Female	282	51.1	423	54.9	0.86	0.69–1.07	0.17			
Male	270	48.9	348	45.1						
Age (years)[a,b]										
< 2	122	24.4	49	6.5	4.81	3.33–66.96	< 0.001	7.08	4.72–10.63	< 0.001
2–14	70	14.0	230	30.6	0.59	0.43–0.80	< 0.001	0.92	0.65–1.29	0.62
15–64	222	44.4	429	57.1	1			1		
≥ 65	86	17.2	43	5.7	3.86	2.59–5.77	< 0.001	3.59	2.29–5.67	< 0.001
Season										
2014/2015	39	7.8	42	5.6	1					
2015/2016	66	13.2	99	13.2	0.72	0.42–1.23	0.22			
2016/2017	34	6.8	101	13.4	0.36	0.20–0.65	< 0.001			
2017/2018	96	19.2	146	19.4	0.71	0.43–1.17	0.18			
2018/2019	265	53.0	363	48.3	0.79	0.49–1.25	0.31			
Flu vaccination during current season										
Yes	8	1.4	12	1.6	0.93	0.38–2.29	0.87			
No	544	98.6	759	98.4						
Existence of cases in the surrounding area										
Yes	51	9.2	260	33.7	0.20	0.14–0.28	< 0.001	0.22	0.15–0.31	< 0.001
No	501	90.8	511	66.3						
Diabetes										
Yes	60	10.9	30	3.9	3.01	1.92–4.74	< 0.001	1.98	1.13–3.49	0.017
No	492	89.1	741	96.1						
Obesity										
Yes	24	4.3	8	1.0	4.34	1.93–9.72	< 0.001	2.94	1.08–7.99	0.034
No	528	95.7	763	99.0						
Asthma or chronic respiratory disease										
Yes	80	14.5	26	3.4	4.86	3.07–7.67	< 0.001	4.99	2.97–8.38	< 0.001
No	472	85.5	745	96.6						
Chronic heart disease										
Yes	41	7.4	19	2.5	3.18	1.82–5.53	< 0.001			
No	511	92.6	752	97.5						

Table 2 Risk factors for hospitalization due to influenza-associated severe acute respiratory infection among 1323 positive cases and controls, 2014–2019 seasons, Morocco *(concluded)*

Variable	Influenza-associated SARI (n = 552)		Influenza-associated ILI (n = 771)		Univariate analysis			Multivariate analysis		
	No.	%	No.	%	Crude OR	95% CI	P-value	Adjusted OR	95% CI	P-value
Chronic renal failure										
Yes	18	3.3	5	0.6	5.16	1.91–13.99	< 0.001	4.74	1.59–14.04	0.005
No	534	96.7	766	99.4						
Chronic neurological disease										
Yes	10	1.8	1	0.1	14.21	1.81–111.31	0.001[c]	10.48	1.24–88.58	10.03
No	542	98.2	770	99.9						
Chronic haematologic disease										
Yes	12	2.2	0	0.0	Undefined	Undefined	< 0.001[c]			
No	540	97.8	771	100.0						
Pregnancy[d]										
Yes	41	14.5	11	2.6	6.37	3.21–12.63	< 0.001	7.49	3.58–15.69	< 0.001
No	241	85.5	412	97.4						
Influenza virus type and subtype[e]										
A (H1N1)	319	58.7	332	43.1	1.89	1.51–2.35	< 0.001	1.82	1.39–2.38	< 0.001
A(H3N2)/B	224	41.3	439	56.9						

[a]Missing values excluded from data analysis.
[b]χ^2 = 152.43, df = 3.
[c]Fisher's exact test.
[d]Only female cases.
[e]A not subtyped cases excluded.

considerable importance from a clinical and public health perspective, considering its implications for influenza patient management, population vaccination, communication and preparedness for a seasonal epidemic. Indeed, the severity of an influenza season varies from year to year depending on factors such as vaccination efficacy, early administration of antiviral drugs and the circulating influenza strain.

This hypothesis has been examined in several studies, however, these were not comparable in terms of study setting and design, populations studied, sample size, clinical presentation, influenza viruses compared, and consideration for potential confounders. The 2009 H1N1 pandemic suggested that influenza A/H1N1pdm09 (A/H1) may have more severe clinical impacts than other seasonal influenzas and was more severe in the younger age group (*18*). This evidence has been the subject of critical discussion in the post-pandemic years as study findings on the severity of epidemics by type and subtype of influenza virus have varied widely. Some studies have suggested that influenza A(H1N1)pdm09 led to relatively more severe outcomes compared to other types and subtypes (*19,20*). Others have reported no statistically significant differences in case-fatality rates and other markers of severity by type and subtype (*21,22*) or have shown that the risk for serious outcomes was increased in hospitalized patients infected with influenza A(H3N2) (*23,24*).

In Morocco, this question was of great concern during the 2018/2019 season, where influenza A(H1N1)pdm09 predominated, as was the case in many parts of the world. Following the death of an A(H1N1)pdm09 infected pregnant woman, a fierce social media campaign ensued around the theme of the severity of the circulating A(H1N1)pdm09 subtype and resulted in general panic among the Moroccan population leading to an overload of both hospital and ambulatory health services. In this context, the country's health authorities were required to provide answers to incessant questions around the severity of the influenza season through the social, political and parliamentary organizations.

Our findings, based on the analysis of data provided by the Morocco sentinel virological influenza surveillance system

over 5 seasons, suggested that influenza A/H1N1pdm09 (A/H1) may have more severe clinical impacts than other seasonal influenza types. The sizeable peak in the 2018/2019 season according to established epidemic thresholds in Morocco was certainly due to the rush among the population to access health services (*13*). However, the predominance of A(H1N1)pdm09 may have contributed considerably because of the increased transmissibility and severity of this circulating strain (Figure 1, Table 2).

The vast majority of patients have mild influenza during seasonal peaks. However, other patients with specific risk factors develop SARI and require hospitalization due to respiratory distress or a complication of an underlying chronic disease (*25*). Thus, we usually observe an increase in the number of cases of acute asthma (*26*), acute exacerbation of chronic obstructive pulmonary disease (*27*), decompensation of metabolic diseases such as diabetes (*28*), heart disease (*29*) or others (*30*), as well as an increase in hospitalizations of those at the extremes of age (infants and the elderly) (*31*) and pregnant women (*32*). Asthma is often debated as a risk factor for severe influenza, but it is instead considered as a risk factor for hospitalization rather than severe outcome.

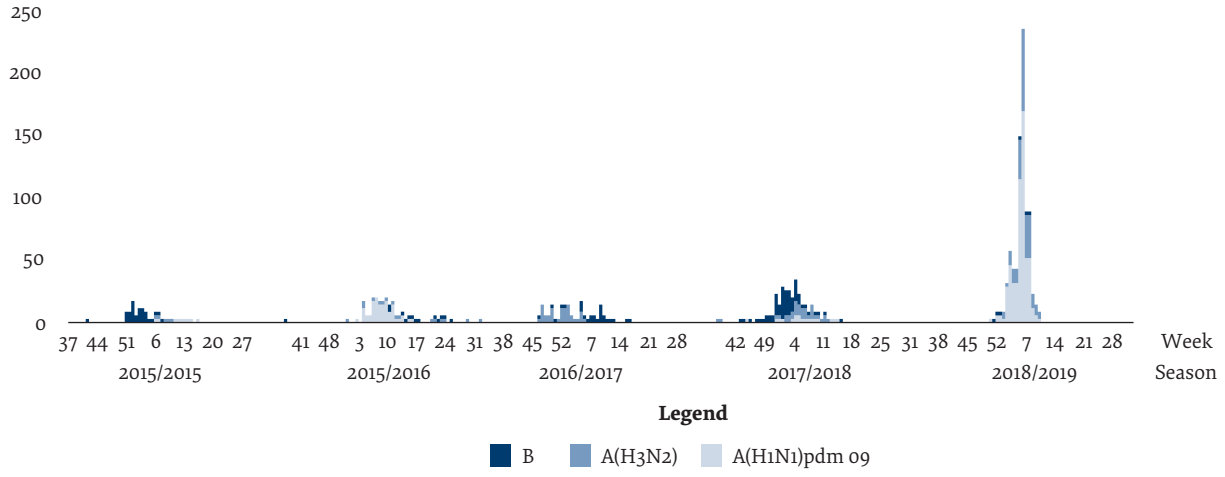
Considering that high-risk groups for influenza-associated acute respiratory infection have not been well defined in the low- and middle-income countries, in 2012 the WHO Strategic Advisory Group of Experts on Immunization (SAGE) proposed specific recommendations based on a comprehensive review of the influenza disease burden, vaccine performance and safety in populations, incorporating available data from low- and middle-income country settings. The SAGE recommended pregnant women, healthcare workers, children aged 6–59 months, the elderly and those with specific chronic medical conditions to be targeted by national influenza vaccination programmes (*8*).

Available research on risk factors for a severe outcome of influenza were conducted in different settings, designs and sample sizes. They may be of distinct scientific value, yet their results are generally consistent with the WHO recommendations concerning groups at high risk of contracting influenza (8). They assess the association of risk factors with either hospitalization (versus non-hospitalization) for community-based studies (*33*) or with severe pneumonia (versus non-severe pneumonia) for hospital based studies (*34*). These studies were carried out in developed countries and used a structured community and hospital health database that included information on clinic visits or hospital admissions. Diagnosis of cases and comorbidities were recorded based on the International Classification of Diseases, 10th revision (ICD 10) codes. There is limited information on risk groups in low- and middle-income countries. In this context, cases identification was based on the WHO case definition of SARI and ILI as usually the study data were provided by sentinel influenza surveillance systems established as recommended by the WHO (*34*).

Our study falls into this second category, usually designed as a retrospective observational study. Assuming that the sampling method was randomized for both SARI cases in hospitals and ILI outpatients in primary health centres, we could have considered such studies as a powerful tool that could provide evidence to suggest causality as well as information regarding the strength of an association between the disease and the risk factors.

In addition to A(H1N1)pdm09 subtype, extreme ages (the elderly and infants) and major comorbidities such as diabetes, asthma or chronic respiratory disease, chronic renal failure, chronic neurological disease and pregnancy are strongly associated with hospitalization for SARI due to influenza virus in the multivariable analysis. Having chronic heart disease was strongly associated with hospitalization for influenza in the bivariate analysis (OR = 3.18) but this association became non-significant in the multivariable analysis by logistic regression

Figure 1 Number of positive influenza samples (severe acute respiratory illness and influenza-like illness) by type and subtype, Morocco, 2014–2019



(Table 2). A confounding effect could explain this since chronic heart disease and age ≥ 65 years are strongly associated. The presence of cases in the surrounding area (OR = 0.21) was found statistically significantly associated with mild influenza seen in outpatient settings due probably to the predominance of transmission at younger ages in schools and workplaces as well as within the family and among friends (Table 2).

Our study had some limitations. We could not authenticate the quality of the data since the International Classification of Diseases is still not used in Morocco. The analytical study design with a comparative group recruited from primary health centres may be less scientifically robust than studies carried out in hospitals in developed countries with well-established severity scores. Sentinel influenza surveillance is based on an urban environment in Morocco. Thus, our results cannot be generalized to the whole country, especially the rural and Saharan regions. In spite of these limitations, we were able to provide reasonable estimates of risk factors for influenza-associated SARI hospitalization, thus enabling the appreciation of influenza as an important public health concern in Morocco in the context of limited information as well as low vaccination uptake and antiviral medicine use.

Conclusion

The evaluation in Morocco of the risk factors for hospitalization of severe influenza over 5 seasons once again provides epidemiological evidence regarding the expected benefits of an influenza vaccination strategy for the high risk groups as recommended by the WHO. The observed severity of influenza during the seasons, where the A (H1N1) subtype was predominant, reinforces this recommendation.

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Facteurs associés aux cas d'hospitalisation pour la grippe saisonnière au Maroc

Résumé

Contexte : Le Maroc s'emploie activement à élargir sa politique de vaccination antigrippale afin d'inclure les groupes à haut risque, conformément aux recommandations de l'Organisation mondiale de la Santé (OMS).

Objectifs : Nous avons évalué les facteurs de risque d'hospitalisation liée à la grippe pour les infections respiratoires aiguës sévères (IRAS) survenues au cours des cinq dernières saisons.

Méthodes : Nous avons mené une étude analytique rétrospective auprès de patients recrutés dans les sites ambulatoires et les hôpitaux faisant partie du système de surveillance sentinelle de la grippe au Maroc entre 2014 et 2019. À l'aide de la régression logistique multiple, nous avons comparé les caractéristiques des patients positifs à la grippe et atteints d'une IRAS à celles des patients ayant un syndrome de type grippal (STG) afin d'identifier les facteurs associés à une forme grave de la maladie.

Résultats : Nous avons inclus 1323 patients positifs à la grippe présentant soit une IRAS (41,7 %) soit un diagnostic de STG (58,3 %). Les virus de la grippe A(H1N1)pdm09, A(H3N2) et B, représentaient respectivement 49,2 %, 29,5 % et 20,6 % des cas. Les principaux facteurs de risque pris en compte dans l'analyse bivariée se sont avérés, dans l'analyse multivariée, être significativement associés aux cas d'hospitalisation liés à la grippe (IRAS) : âge < 2 ans (ORa = 7,08, $p < 0,001$) ; âge ≥ 65 ans (ORa = 3,59, $p < 0,001$) ; diabète (ORa = 1,98, $p = 0,017$) ; obésité (ORa = 2,94, $p = 0,034$) ; asthme ou maladie respiratoire chronique (ORa = 4,99, $p < 0,001$) ; insuffisance rénale chronique (ORa = 4,74, $p = 0,005$) ; grossesse (ORa = 7,49, $p < 0,001$) ; et sous-type A(H1N1)pdm09 (ORa = 1,82, $p < 0,001$).

Conclusion : La présente étude fournit des données épidémiologiques sur les avantages escomptés d'une stratégie de vaccination antigrippale destinée aux groupes à haut risque, conformément aux recommandations de l'OMS.

العوامل المرتبطة بالإدخال إلى المستشفى بسبب الإنفلونزا الموسمية في المغرب

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الخلاصة

الخلفية: يعمل المغرب بفعالية على توسيع نطاق سياسته المعنية بلقاح الإنفلونزا ليغطي الفئات المعرضة لخطر شديد، على النحو الذي أوصت به منظمة الصحة العالمية.

الأهداف: هدفت هذه الدراسة الى تقييم عوامل خطر الإدخال إلى المستشفى المرتبط بالإنفلونزا بالنسبة لحالات العدوى التنفسية الحادة الوخيمة التي حدثت خلال المواسم الخمسة الماضية.

طرق البحث: أجرينا دراسة استعادية تحليلية بين المرضى في المواقع الإسعافية والمستشفيات التابعة لنظام الترصُّد المخفري للإنفلونزا في المغرب في الفترة بين عامَي 2014 و2019. وباستخدام الانحدار اللوجستي المتعدد، عقدنا مقارنةً بين خصائص المرضى الإيجابيين للإنفلونزا المصابين بالعدوى التنفسية الحادة الوخيمة، وأولئك المُصابين باعتلال شبيه بالإنفلونزا، لتحديد العوامل المرتبطة بالمرض الوخيم.

النتائج: أدرجنا 1323 مريضًا إيجابيًا للإنفلونزا من المصابين إما بعدوى تنفسية حادة وخيمة (41.7٪) أو اعتلال شبيه بالإنفلونزا (58.3٪). وساهمت أنماط الإنفلونزا A(H3N2), A(H1N1) pdm09 ، وB بنسبة 49.2٪، و29.5٪، و20.6٪ من الحالات، على التوالي. وتبين في التحليل المتعدد المتغيرات أن عوامل الخطر الرئيسية التي أُخذت بعين الاعتبار في التحليل ذي المتغيرين كانت مرتبطة ارتباطًا كبيرًا بالإدخال إلى المستشفى المرتبط بالإنفلونزا (العدوى التنفسية الحادة الوخيمة): العمر < عامين (نسبة الأرجحية المعدَّلة = 7.08، القيمة الاحتمالية < 0.001)؛ العمر ≥ 65 عامًا (نسبة الأرجحية المعدَّلة = 3.59، القيمة الاحتمالية < 0.001)؛ السكري (نسبة الأرجحية المعدَّلة = 1.98، القيمة الاحتمالية = 0.017)؛ السمنة (نسبة الأرجحية المعدَّلة = 2.94، القيمة الاحتمالية = 0.034)؛ الربو أو مرض تنفسي مزمن (نسبة الأرجحية المعدَّلة = 4.99، القيمة الاحتمالية < 0.001)؛ الفشل الكلوي المزمن (نسبة الأرجحية المعدَّلة = 4.74، القيمة الاحتمالية = 0.005)؛ الحمل (نسبة الأرجحية المعدَّلة = 7.49، القيمة الاحتمالية < 0.001)؛ والنمط الفرعي A(H1N1)pdm09 (نسبة الأرجحية المعدَّلة = 1.82، القيمة الاحتمالية < 0.001).

الاستنتاجات: تقدم هذه الدراسة دلائل وبائية عن المنافع المُتوقَّعة من استراتيجية التطعيم ضد الإنفلونزا للفئات المُعرضة لخطر شديد، على النحو الذي أوصت به منظمة الصحة العالمية.

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