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INFLUENZA VIRUS CIRCULATION DURING 2024-2025 SEASON IN RABAT, MOROCCO

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ABSTRACT

Introduction: Influenza remains a major cause of respiratory morbidity worldwide. The World Health Organization (WHO) estimates that seasonal influenza epidemic is responsible for millions of severe infections and hundreds of thousands of deaths each year.

Global surveillance of influenza viruses is coordinated via the World Health Organization Global Influenza Surveillance and Response System (GISRS). The organization follows circulating influenza virus on all continents and provides relevant information for vaccine strain selection as well as public health considerations. This study describes the circulation patterns of influenza viruses at Mohammed V Military Teaching Hospital (MVMTH) in Rabat during the 2024-2025 Influenza season.

Methods: A prospective observational study was conducted from October 2024 to March 2025. Nasopharyngeal swabs from patients with influenza-like illness were analyzed using RT-PCR (Film Array Respiratory Panel and GeneXpert Xpress Flu/RSV).

Results: Influenza A viruses showed up in most of the tested samples. Among influenza A viruses, viral A(H1N1)pdm09 infection was detected the most commonly.

Influenza B viruses were also recorded but circulated at lower levels during the surveillance period. One hundred and sixteen cases were confirmed. Influenza A predominated (80%; n=93), while Influenza B accounted for 20% (n=23). Among Type A cases, A(H1N1)pdm09 was the primary subtype identified (64.5%; n=60), followed by non-subtyped

strains (35.5%; n=33). A(H3N2) circulation was marginal (2.8%). Temporally, A(H1N1) peaked in week 4 of 2025, whereas Influenza B showed dominant activity in the late season (Weeks 14-17).

Conclusion: The 2024-2025 season was characterized by the dominance of Influenza A(H1N1) and a late-season shift to Influenza B. These findings highlight the necessity of local surveillance to optimize hospital resource allocation and vaccination timing in Morocco.

Keywords: Influenza, Morocco, Surveillance, RT-PCR.

1 INTRODUCTION

Seasonal influenza viruses represent a persistent threat to global public health, responsible for an estimated 3 to 5 million cases of severe illness and up to 650,000 respiratory deaths annually contributing significantly to the burden of Severe Acute Respiratory Infections (SARI) across Africa [1]. Global surveillance of influenza viruses is coordinated via the World Health Organization Global Influenza Surveillance and Response System (GISRS). The organization follows circulating influenza virus on all continents and provides relevant information for vaccine strain selection as well as public health considerations. In Morocco, influenza surveillance is carried out through the national sentinel network [2]. However, hospital-specific data remain crucial for understanding the clinical impact in urban centers like Rabat [3,4,5]. This study aimed to characterize the types and subtypes of influenza circulating at MVMTH and in Morocco, during the 2024-2025 season [6,7].

In this article, we report the virological characteristics, and epidemiological implications of the influenza virus detected in Morocco during the 2024-2025 season, contributing valuable data to the global effort to monitor and combat seasonal influenza.

2 METHODS

The study was conducted at the laboratory of Virology of the Center of Virology and Infectious and Tropical Diseases (CVITD). Respiratory specimens were collected from patients presenting with influenza-like illness, defined according to WHO standards as the sudden onset of fever $>38^{\circ}\text{C}$, cough, and sore throat in the absence of other known causes [8]. Nasopharyngeal swabs were collected from patients during the 2024-2025 influenza season, from October 2024 through March 2025. Swabs were placed immediately into sterile tubes containing viral transport medium and transported under cold chain conditions (4°C) to the CVITD, within 2 hours of collection. Upon arrival, specimens were aliquoted and stored at -80°C until PCR-test, using two kits: the Xpert Xpress Flu/RSV/SARS-CoV-2 assay from Cepheid®, used for rapid clinical triage, it is designed to detect the presence of Influenza A virus, but it does not differentiate between subtypes of Influenza A (such H1N1 and H3N2) the test is optimized for speed, around 30 minutes [9,10]. To add subtyping we use the second test: The BioFire FilmArray Respiratory (RP) Panel is more complex with additional primers and probes to subtype the Hemagglutinin "H" gene of the Influenza A virus, which increase cost, and time [9,11].

Laboratory and epidemiological samples were extracted from the laboratory information system, weekly distribution of cases and virus subtype circulation were detailed and epidemic curve was drawn for time period.

3 RESULTS

During the 2024-2025 influenza season, a total of 116 laboratory-confirmed cases were recorded. The distribution (Figure1) showed a high prevalence of Influenza A with 93 cases (80%) compared to 23 cases Influenza B (20%). Among the Influenza A cohort, Influenza A(H1N1)pdm2009 was the most frequent (n= 60, 64.5%), while A(H3N2) was identified in only 2.8% of cases. A significant portion (n=33, 35.5%) remained non-subtyped Influenza A. Viral activity started in January (Week 1 of 2025), with A(H1N1) reaching its peak in Week 4. As Type A activity declined toward March, a distinct secondary wave of Influenza B was observed, then declining in Week 17.

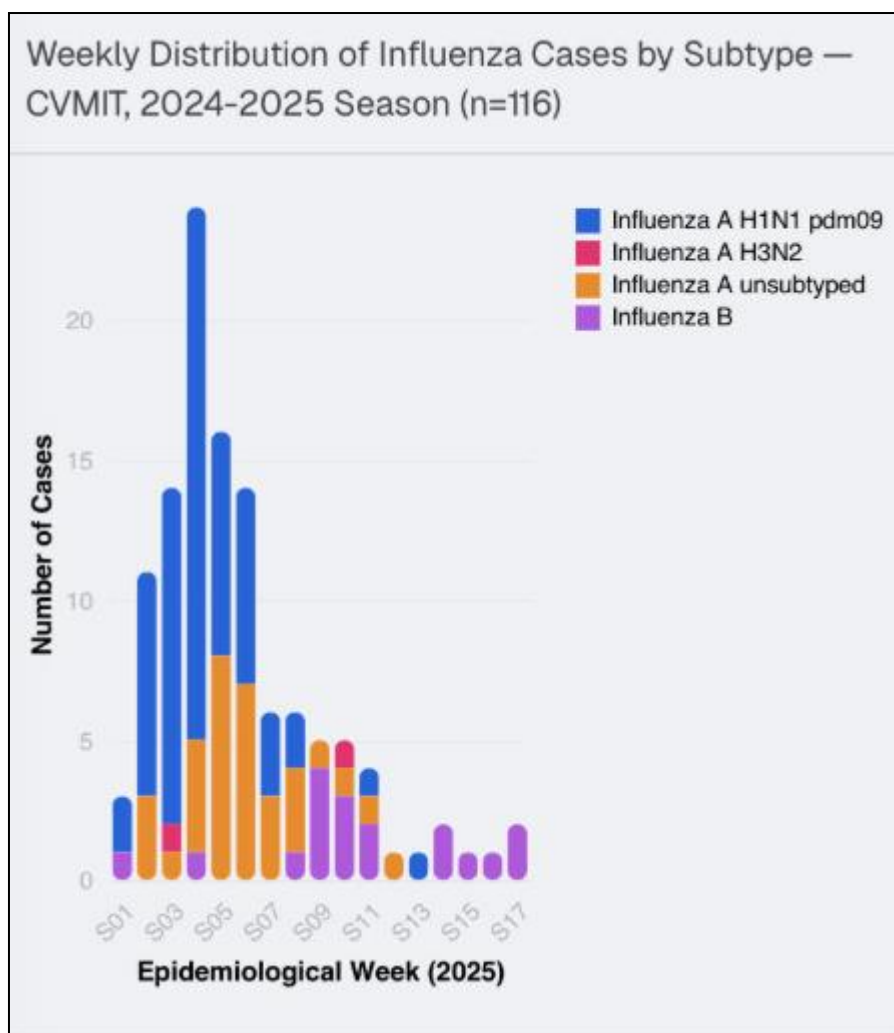


Figure 1: Weekly trend of detected Influenza viruses, Rabat 2024-2025 season

4 DISCUSSION

The MVMTH weekly distribution of influenza positives (Figure 1) revealed a distinct seasonal pattern than the national one. The influenza epidemic in our Hospital started later in week 01 of 2025, and activity began increasing and peaked in week 4 of 2025, then declined through week 09 [6]. A(H1N1)pdm09 was the dominant subtype throughout the peak month, A(H3N2) circulation peaked slightly later, with its highest proportion observed in Week 5. Influenza B viruses emerged later in the season, accounting of positives in week 9. In national report data, week 40–48 of 2024 (October–November) marked the start of the epidemic with low positivity is driven by sporadic A/H1N1 cases. The peak positivity (>35%) in weeks 49 to 52 with predominantly A/H1N1, which dominates the early season. The weeks 1 to 4 were dominated by A/H1N1 circulation, with the first appearance of A/H3N2. Weeks 5 to 8 showed a declining positivity rates and sustained by influenza B, which typically circulates later. This strain extends the epidemic tail and may affect younger populations more significantly. In the late weeks 9–12, multiple strains circulated in succession: A/H1N1, A/H3N2, and B – extending the overall epidemic period by 2–3 weeks. During weeks 13 to 15, surveillance of acute respiratory infections revealed a progressive decrease in influenza activity across the country. This decline follows the epidemic rebound observed nationally between weeks 8 and 10, which had prolonged the seasonal epidemic. This trend is consistent with that observed across the Northern Hemisphere, where influenza activity is generally declining or stable. However, some localized increases persist, particularly in Central America, the Caribbean, East Africa, Northern Europe, and Western Asia. In these regions, the positivity rate remains high, with a predominance of the A(H1N1)pdm09 virus, although other influenza subtypes are co-circulating depending on the area.[6,7] In week 15, influenza activity remained low in most regions, signaling a return to the interseasonal level. Our findings confirm that Influenza A(H1N1)pdm09 was the driver of the 2024-2025 season in Rabat, consistent with patterns observed in other North African settings [10]. The low detection of A(H3N2) suggests a narrower strain diversity this season, which may impact population-level immunity in subsequent years [11,12]. In week S19, ARI surveillance confirmed the downward trend in influenza activity, a return to inter-seasonal levels across most of the country, and residual activity consistent with historical fluctuations. This persistence at a low level, corroborated by the decrease in viral detections,

particularly of subtypes A and B, suggests the end of the seasonal influenza epidemic. The national epidemiological situation aligns with trends observed for the same period across the Northern Hemisphere: for influenza, a marked improvement is observed in most regions, where the virus positivity rate has continued to decrease or has remained generally stable [13]. The 2024-2025 influenza season at MVMTH was marked by a late start from January, with predominant H1N1 peak followed by a late-season B-wave [14]. These characterizations of circulating strains is essential for understanding local transmission dynamics, evaluating vaccine strain match, and suggest that surveillance should extend well into the spring months in Morocco.

5 CONCLUSION

Seasonal influenza viruses are constantly evolving, local surveillance plays an important role in global virological surveillance and in warning of the emergence of new viruses to optimize hospital resource allocation and vaccination timing.

STATEMENTS ON COMPLIANCE WITH ETHICAL STANDARDS

Disclosure of conflict of interest

The authors declare no conflicts of interest regarding this manuscript.

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