



# The Impact of The Flu in an Internal Medicine Ward in Portugal: A Retrospective Case Series

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Received 28 August 2024;

Accepted 12 September 2024;

Published 15 September 2024

## Abstract

Influenza is a sudden-onset viral illness that mainly affects the respiratory tract. Worldwide, it is responsible for 3 to 5 million cases of serious illness and up to 650,000 deaths per year. Annual vaccination is the main method of prevention and should be targeted at high-risk population groups. This retrospective study's objective was to characterize the cases with a positive test for the influenza virus in nasopharyngeal exudate in an internal medicine ward and its risk factors. It was based on consultation of the medical records of patients hospitalized in the 2018/19 flu season, with evaluation of clinical, demographic and vaccination characteristics, the type and strain of Influenza virus, duration of hospitalization, need for oxygen therapy, use of antivirals and antibiotics and death rate. 52 patients were included, predominantly female (61.5%), with a mean age of 79.6 years. 92.3% had at least one comorbidity (in decreasing frequency: cardiovascular disease, lung disease, diabetes mellitus, cancer, immunosuppression, chronic kidney disease, obesity and liver disease). Influenza A virus was identified in all patients and of these (H3N2 in 71% and H1N1 in 15%). Only a minority (13.5%) of patients were vaccinated. Over a third of the patients had bacterial superinfection. In one fifth, antibiotic therapy was started in the emergency room but later suspended due to poor conviction of superinfection. The majority of patients (88.5%) had respiratory failure; 7.5% worsened kidney function and 2% worsened liver function. 94% of patients were medicated with oseltamivir and of these, 17% were able to complete the cycle on an outpatient basis. Mortality was 7.7%. In conclusion, the vaccination rate in the population studied was much lower than desired. The inappropriate use of antibiotic therapy in the emergency room was also noteworthy, sometimes without clear suspicion of bacterial superinfection.

**Keywords:** *influenza, flu, vaccination, antibiotic stewardship.*

## Introduction

Influenza, commonly known as the flu, is a sudden-onset viral illness that mainly affects the respiratory tract. It is one of the most common infectious diseases and it is highly transmissible. Worldwide, it is responsible for 3 to 5 million cases of serious illness and up to 650 thousand deaths per year <sup>[1]</sup>.

There are 4 types of influenza viruses: A, B, C and D. Influenza A and B viruses are the most relevant in the clinical practice (as type C only causes mild disease and type D doesn't affect humans) <sup>[1]</sup>.

As outbreaks of the illness occur mainly in winter <sup>[2]</sup>, annual vaccination at the start of the colder months is the main method of prevention and should be targeted at high-risk population groups, such as the elderly. Currently, the guidelines from the portuguese General Health Directorate <sup>[3]</sup> recommend vaccination for anyone who is:

- Aged 60 years old or over (a recent change, as at the time of this study the age cut-off was 65 years);
- Chronically ill or immunocompromised;

- Pregnant;
- A healthcare professional or special care provider.

The vaccine is free for several of these groups <sup>[3,4]</sup>.

According to the World Health Organization recommendation, the trivalent vaccine for the 2018/19 season covered: the influenza A H1N1 strain, influenza A H3N2 and one strain of Influenza B. The tetravalent vaccine further covered another strain of Influenza B <sup>[5]</sup>.

## Materials and Methods

This retrospective observational study was conducted at an internal medicine ward in the Hospital Santo António dos Capuchos in Lisbon, Portugal, over the winter season between October 1st, 2018 and March 31st, 2019. At the time of this study the ward had a usual capacity of 44 beds, with a contingency plan for the winter season that included the opening of 5 extra beds.

A total of 52 patients were included in the study, based on having a positive test for Influenza A or B on a nasopharyngeal swab (tested by Polymerase Chain Reaction (PCR)). Patients with a

positive test for other viruses, or with suggestive clinical symptoms but without laboratory confirmation were not included.

The information was gathered by revision of the medical records including the discharge notes, daily progress notes and analytical results. Data analysis was performed using Statistical Package for the Social Sciences Software (SPSS).

**Results**

A total of 52 patients were included in the study, aged between 20 and 96 years at the time of hospitalization (with a mean age of 79.6 years). The overwhelming majority (90% - 47 patients) were over 65 years old. 32 patients were female (61.5%) and 20 were male (38.5%). This data is summarized in Table 1. More than half of the patients were described as autonomous (33 - 63.5%), 27% were partially dependent (14 patients), and a minority were completely dependent (5 patients) for basic daily activities as assessed at admission using the Katz Index of Independence.

**Table 1: Demographic data of the sample**

Age in Years	79.6±15 (mean ± st. deviation)
Gender	
Male	20 (38.5%)
Female	32 (61.5%)

**Comorbidities**

In the studied sample, the vast majority (48 patients, 92.3%) had at least 1 comorbidity, with cardiovascular disease being the most common - as described in Table 2.

**Table 2: Comorbidities, by decreasing frequency, of the sample**

Comorbidity	N. of patients	%
Cardiovascular disease	39	75%
Respiratory disease	21	40,4%
Diabetes mellitus	16	30,8%
Cancer	12 (3 lung cancer)	23%
Immunosuppression	8	15,4%
Smoking	7	13,5%
Chronic kidney disease	7	13,5%
Obesity	5	9,6%
Hepatic disease	3	5,7%

A majority of patients (75%) had cardiovascular disease, of which 34 (87%) had hypertension and 19 (48.7%) had a history of heart failure.

Almost half (40.4%) of patients had lung disease, the most common pathology being asthma (17.3% - 9 patients), followed by chronic obstructive pulmonary disease (13.5% - 7 patients). Also noteworthy were 3 patients with active lung cancer and one patient with autoimmune interstitial pneumonia. It should also be noted that 13.5% of the sample (7 patients) were active smokers.

A relevant percentage (15.4%) of patients were in an immunosuppressed state, with immunosuppressive therapy use due to autoimmune disease being the most common cause (6 patients). 1 patient had HIV infection with therapeutic noncompliance and one patient had haematological disease (myelodysplastic syndrome).

**Vaccination Status**

Only 13.5% of the sample (7 patients) had a registered record of being vaccinated against influenza in that season.

**Disease characteristics**

The length of hospital stay was on average 9 days with a standard deviation of 5 days (maximum 28, minimum 3). As for temporal

distribution, we see that hospitalizations only started in December (2 months after the “official” start of the flu season), reaching their peak in the 4th and 5th weeks of 2019 (the final two weeks of January and the first days of February).

The patients were tested for influenza virus in a nasopharyngeal swab, with results presented in Table 3. The Influenza A virus was identified in all patients included, with no cases of Influenza B virus infection being found. The H3N2 strain was the most frequent, having been identified in 71% (37) of the cases, followed by the H1N1 strain in 15% (8) of cases. In 7 cases, the strain of the virus was not identified.

**Table 3: Influenza results of the sample, identified by PCR**

Strain	N. of patients	%
Influenza A (Non-specified)	7	13,5
Influenza A H1N1	8	15,5
Influenza A H3N2	37	71
Influenza B	0	0

**Complications**

A large majority (88.5% - 46 patients) required supplemental oxygen therapy for partial or global respiratory failure. In over a third of the sample (19 patients, 36.5%), the flu was complicated by bacterial superinfection with pneumonia. 4 patients had transitory worsening renal function, and 1 patient had worsening of their underlying liver disease.

**Treatment**

The majority of patients (94% of the sample), received antiviral therapy with Oseltamivir.

In 17% of the cases it was possible to discharge the patient before completing the recommended 5 day of therapy, sending them with a prescription to complete the antiviral cycle at home. Only 3 patients (6% of the sample) did not take Oseltamivir.

20 patients (38.5% of the sample) received antibiotic therapy during hospitalization due to presumption of bacterial superinfection. In 1 patient there was no clear evidence of superinfection but antibiotic therapy was maintained as the patient was immunocompromised. The antibiotics used are described in Table 4, with the combination of amoxicillin/clavulanic acid being the most chosen, in 11 patients.

There were 10 patients who were started on antibiotics in the emergency room, which were later suspended due to poor conviction of superinfection, with no clear clinical or laboratory evidence of bacterial infection. In 3 cases, patients had already received a course of antibiotics by their general practitioner before coming to the hospital.

**Table 4: Antibiotic choice for bacterial superinfection complications**

Antibiotic	N. of patients
Amoxicillin/Clavulanic acid	11
Azitromicin	6 (always in addition to amoxicillin/clav. acid)
Ceftriaxone	4
Piperacillin/tazobactam	4

**Mortality**

In the studied sample, 4 patients died during hospitalization, giving us a mortality rate of 7,7%. They were between 81 and 91 years old and the H3N2 strain of Influenza A was identified in all of them. None had records of being vaccinated. In one of them the death was interpreted in the context of the evolution of the underlying oncologic disease (lung cancer).

## Discussion

It is interesting to note the vast majority of the patients in this sample were older people with at least one comorbidity - meaning, these were people to whom the flu vaccine is not only recommended, but also given for free. Yet the majority was not vaccinated.

The first line recommended treatment in Portugal remains oseltamivir 75mg twice daily for 5 days (10 days in the immunocompromised) [6]. It is recommended to start as soon as possible, ideally in the first 48 hours. The 3 patients that did not receive Oseltamivir had a late diagnosis of Influenza, and evolved favourably with only support therapy, so it was considered that there would no longer be any benefit in starting the medication.

The high frequency of complication by bacterial superinfection can help justify the prolonged duration of hospitalization up to almost a month (28 days) and will certainly contribute to added morbidity.

Conversely, a significant proportion (one fifth) of patients were inappropriately started on antibiotics in the emergency room even though there was poor conviction of any bacterial infection. This study was conducted before rapid antigen test became available in the emergency room, and PCR testing would often take 12 hours to produce a result. This probably contributed to the inappropriate use of antibiotics.

The patients who did not survive were all older and infected with the H3N2 strain, which falls in line with other studies that have suggested the Influenza A/H3N2 strain can lead to a more severe disease course [7,8].

## Conclusions

This was a relatively small sample of 52 patients, in one medicine ward in a central hospital, but it led to some interesting conclusions nonetheless.

The vaccination rate in the evaluated population was much lower than desired. As influenza is a potentially vaccine-preventable disease, it can be assumed that most of these hospitalizations could have been avoided or shortened.

It's also relevant to note the high and sometimes inappropriate use of antibiotic therapy in the emergency room, sometimes without any clinical or laboratory indication of bacterial superinfection. The increased availability of rapid antigen tests for respiratory viruses in the emergency room setting may contribute to reduce inappropriate antibiotic prescription.

## Ethics approval and consent to participate

As this study involved solely the collection of data, with no patient identifiers, it was conducted under a waiver of consent.

## List of abbreviations

PCR: Polymerase Chain Reaction

SPSS: Statistical Package for the Social Sciences Software

## Conflicts of Interest

The authors declare that there is no conflict of interest regarding the publication of this paper.

## Funding Statement

This study was not funded by any institution.

## Authors' contributions

BB collected and analysed the patient data and wrote the manuscript. RE was a major contributor in writing and reviewing the manuscript. BS was a major contributor in reviewing the manuscript. ML was a major contributor in reviewing the manuscript. CL was a major contributor in reviewing the manuscript. ACPP was a major contributor in reviewing the manuscript. MR was a major contributor in reviewing the manuscript. JSF was a major contributor in reviewing the manuscript. EM was a major contributor in writing and reviewing the manuscript.

All authors read and approved the final manuscript.

## References

- [1] [https://www.who.int/news-room/fact-sheets/detail/influenza-\(seasonal\)](https://www.who.int/news-room/fact-sheets/detail/influenza-(seasonal))
- [2] Kasper, D., Fauci, A., Hauser, S., Longo, D., Jameson, J., & Loscalzo, J., Harrison's Principles of Internal Medicine, Mc Graw Hill, Education
- [3] <https://www.dgs.pt/ficheiros-de-upload-2013/norma-para-vacinacao-sazonal-contr-a-gripe-2023-pdf.aspx>
- [4] <https://www.sns24.gov.pt/tema/vacinas/vacinacao-gripe-e-covid-19/#a-vacinacao-sazonal-gripe-e-covid-19-e-gratuita>
- [5] <https://www.who.int/publications/m/item/recommended-composition-of-influenza-virus-vaccines-for-use-in-the-2018-2019-northern-hemisphere-influenza-season>
- [6] EMA (European Medicines Agency) – Tamiflu medicine overview - [https://www.ema.europa.eu/en/documents/overview/tamiflu-epar-medicine-overview\\_en.pdf](https://www.ema.europa.eu/en/documents/overview/tamiflu-epar-medicine-overview_en.pdf)
- [7] Simonsen L, Clarke MJ, Williamson GD, Stroup DF, Arden NH, Schonberger LB. The impact of influenza epidemics on mortality: introducing a severity index. *Am J Public Health.* 1997 Dec;87(12):1944-50. doi: 10.2105/ajph.87.12.1944. PMID: 9431281; PMCID: PMC1381234.
- [8] Kaji M, Watanabe A, Aizawa H. Differences in clinical features between influenza A H1N1, A H3N2, and B in adult patients. *Respirology.* 2003 Jun;8(2):231-3. doi: 10.1046/j.1440-1843.2003.00457.x. PMID: 12753540.



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