# Assessing the use and performance of an Influenza testing algorithm

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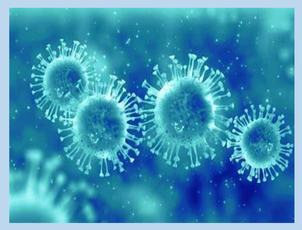

## Abstract:

Aim: To assess the number of patients admitted to the emergency department in February 2020 who had an Influenza PCR test performed and did not fulfil the criteria for testing as per the influenza testing algorithm.
Background: Prior to COVID-19 pandemic, annually the Influenza season had a high impact on the Irish health system. During the 2018/2019 Influenza season 41% (n=3,244) of all patients with Influenza notified to the HPSC were hospitalised. Based on local data the Microbiology Department, Mater Hospital developed an Influenza testing algorithm to guide appropriate Influenza testing for in-patients based on symptoms. The algorithm acts to improve patient flow, patient placement and to prevent outbreaks of Influenza in the hospital. However, analysis of data shows that detection rates decrease at the end of the Influenza season (February/March).
Methods: Retrospective study. Electronic records of all patients who attended the ED in February 2020 and had an Influenza PCR test performed were reviewed. Symptoms recorded were correlated with the Influenza testing algorithm. Of note the COVID 19 pandemic impacted on the methodology as only electronic records were reviewed.
Results: Between October 2019-March 2020, 1427 patient samples were tested for Influenza PCR in the Mater hospital- 943 (66%) were performed from in ED. 21% (n=199) were Influenza PCR detected. In February, only 17.1% of samples tested were Influenza PCR detected and the sensitivity of the algorithm was 88.2% and the specificity 90.5%. In February the prevalence of Influenza was low. The positive predictive value of the algorithm was 68.1% and the negative predictive value 97.1%.
Results: When the symptoms of the patients in this cohort were reviewed with the Influenza testing algorithm 75.8% (n=69) did not fulfil the criteria for testing. However, the algorithm potentially may have missed two patients- a 90yo diabetic and a patient with a cough and an ill relative on return from a cruise. A diagnostic test should be used to supplement rather than substitute clinical acumen. It is important to note that a large number of the patients tested may not have required an Influenza test.

## Aim of this study:

To assess the number of patients admitted to the emergency department (ED) in February 2020 who had an Influenza PCR test performed and did not fulfil the criteria for testing as per the Influenza testing algorithm.

## Background:

Annually the influenza season has a high impact on the Irish health system. This is partly caused by high attendances to ED's and high rates of isolation bed requirements. During the 2018/2019 flu season 41% (n=3,244) of all patients with influenza notified to the HPSC were hospitalised. During this same season there were 66 influenza outbreaks, 49% were in hospital settings. National surveillance has shown that the most frequently reported symptoms included: fever (98%), cough (89%) and fatigue (87%).

Based on this local surveillance data the Microbiology department, Mater hospital has developed an Influenza testing algorithm to guide appropriate influenza testing for in-patients based on symptoms (Figure 1). The algorithm acts to improve patient flow, patient placement and to prevent outbreaks of flu in the hospital. However, analysis of data shows that detection rates decrease at the end of the Influenza season.

Figure 1.

Patient presents to the Emergency Department with:
Fever AND
Cough or shortness of breath
AND *one or more* of the following
Sore throat
Muscle aches and pains
Headache

## Standards:

Local surveillance data (HPSC and Mater Hospital).

## Methodology:

This was a retrospective study. Electronic records of all patients who had attended the ED in February 2020 and had an Influenza PCR test performed were reviewed. Symptoms recorded in the electronic chart were noted and correlated with the influenza testing algorithm.

Of note the COVID 19 pandemic impacted on the methodology of this audit as only electronic records were reviewed. No patients were interviewed. Also, it was felt that the symptoms of COVID 19 in patients increased the Influenza test requesting in March and therefore reduced the detection rate.

## Results:

The first Influenza PCR detected result was 6/11/19 and the last was 24/3/2020. Between October 2019-March 2020, 1427 patient samples were tested for Influenza PCR in the Mater hospital (Table 1). Of these, 943 (66%) were performed on patient samples from the ED. Twenty-one percent (n=199) were Influenza PCR detected. Detection rates were at the lowest in February (17.1%) and March (4.8%) (Table 2). When Influenza symptoms (as per the Influenza testing algorithm) were compared to the Influenza PCR results it was found that during February, the sensitivity of the algorithm was 88.2% and the specificity 90.5%. During this time the prevalence of Influenza was low, the positive predictive value of the algorithm was 68.1% and the negative predictive value 97.1%. Of note the electronic records of five patients were incomplete and were not included in the study.

**Table 1:** Total samples tested for Influenza PCR in Mater hospital, October 2019-March 2020

| Month | Total number samples tested for Influenza PCR | Total number of samples Influenza PCR Detected | Percentage (%) number of samples Influenza Detected /Total Tested |
|---|---|---|---|
| October 2019 | 18 | 0 | 0 |
| November 2019 | 104 | 18 | 17.3 |
| December 2019 | 368 | 123 | 33.4 |
| January 2020 | 365 | 74 | 20.3 |
| February 2020 | 148 | 18 | 12.2 |
| March 2020 | 424 | 26 | 6.1 |
| **Total** | 1427 | 259 | 18.1 |

**Table 2:** Number of samples tested for Influenza PCR from ED

| Month | Total number of samples Influenza PCR tested from ED | Total number of samples Influenza Detected | Percentage (%) Influenza Detected /Total tested from ED |
|---|---|---|---|
| October 2019 | 14 | 0 | 0 |
| November 2019 | 71 | 13 | 18.3 |
| December 2019 | 271 | 103 | 38 |
| January 2020 | 262 | 55 | 21 |
| February 2020 | 96 | 17 | 17.1 |
| March 2020 | 229 | 11 | 4.8 |
| **Total** | 943 | 199 | 21.1 |

**Table 3:** Influenza symptoms (as per the Influenza testing algorithm) correlated with Influenza PCR results

| | Influenza PCR Detected | Influenza PCR Not Detected |
|---|---|---|
| Fulfils symptoms as per algorithm for Influenza testing | 15 | 7 |
| Does not fulfil algorithm for Influenza testing | 2 | 67 |

## Conclusion:

In February 2020 only 17.1% of samples tested were Influenza PCR detected. When the symptoms of the patients in this cohort were reviewed with the Influenza testing algorithm 69 (75.8%) did not fulfil the criteria for testing. However, this potentially may have missed two patients with Influenza. On review of these two patients, one of these was a 90-year-old diabetic with a cough only and the other had a cough and myalgia and had a close relative return ill from a cruise. It has been well reported that fever is not always present in the very young and elderly and the immunocompromised. A diagnostic test should be used to supplement rather than substitute clinical acumen.

Of note there were weaknesses in this study. This was a retrospective study and relied on electronic records. It is possible that some of these records may not have been complete. In five patients there were no records.

Notwithstanding it is important to note that a large number of patients may not have required an Influenza test.

Algorithms have the ability to guide clinical practice. It is important that the algorithm is supported by evidence.