

On the Contribution of COVID-19 compared to other Communicable Diseases towards Outbreaks in Healthcare Institutions in Ontario*

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This paper examines the contribution of COVID-19 to the total number of outbreaks within healthcare institutions in Ontario over all months in 2023. It was found that COVID-19 was in fact the highest contributor to outbreaks for the aforementioned year. This investigation is important because it helps healthcare institutions within the province recognize that they need to enforce stricter guidelines surrounding patient hygiene.

1 Introduction

The introduction of vaccines and boosters is what got us out of the COVID-19 pandemic and enabled society to return back to normal. However 4 years and a couple booster shots later, it was found that COVID-19 is still at large in Ontario, attributing to the majority of outbreaks within local healthcare institutions.

Outbreak data from various healthcare institutions (including different floors/departments within these institutions) in Ontario for the year 2023 was analyzed, and a total of 18 diseases (along with some cases left as Pending) attributing to the outbreaks were found, which will be listed out in detail in the Data section. Of all 18 possible diseases, COVID-19 was found to be the highest contributor to outbreaks in 2023 by far.

In subsequent sections, the data will be examined closely, cleaned and contributions from each disease will be analyzed over all the months in 2023. There will be more focus towards COVID-19 however, as we cannot conclude simply from it being the highest contributor overall, that it had a uniformly maximum contribution over all the months in 2023.

*Code and data are available at: https://github.com/FFFiend/outbreaks_in_toronto

2 Data

The outbreak data is from “Outbreaks in Toronto Healthcare Institutions” (Toronto Public Health 2023) on the Open Data Toronto website (Gelfand 2022).

All data analysis was done using the R programming language (R Core Team 2022), on the R-Studio platform (Posit team 2023). Furthermore, the libraries tidyverse (Wickham et al. 2019) and here (Müller 2020) were also used.

The year chosen to examine is 2023, and the raw csv has the following columns.

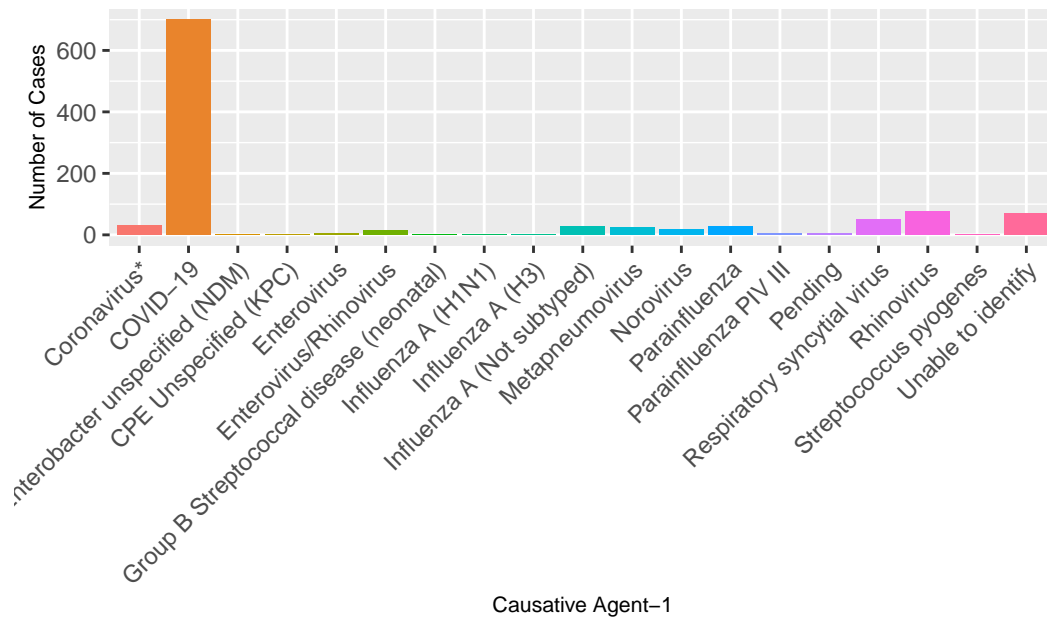
```
[1] "_id"                "Institution Name"    "Institution Address"
[4] "Outbreak Setting"   "Type of Outbreak"    "Causative Agent-1"
[7] "Causative Agent-2"  "Date Outbreak Began" "Date Declared Over"
[10] "Active"
```

The focus will be on the the “Date Outbreak Began” and “Causative Agent-1” columns. The “Causative Agent-2” column will be ignored as some entries are missing values in the aforementioned column. Since the identity of each entry (i.e the institution name, address, and outbreak setting) are of no consequence in our analysis, they will also be ignored. The “_id” variable simply refers to the actual index of the entry within the dataset, and so that is not worth exploring either. We do not concern ourselves with “Date Declared Over” as the speed at which individuals recover from COVID-19 is not the focus of this paper.

3 Results

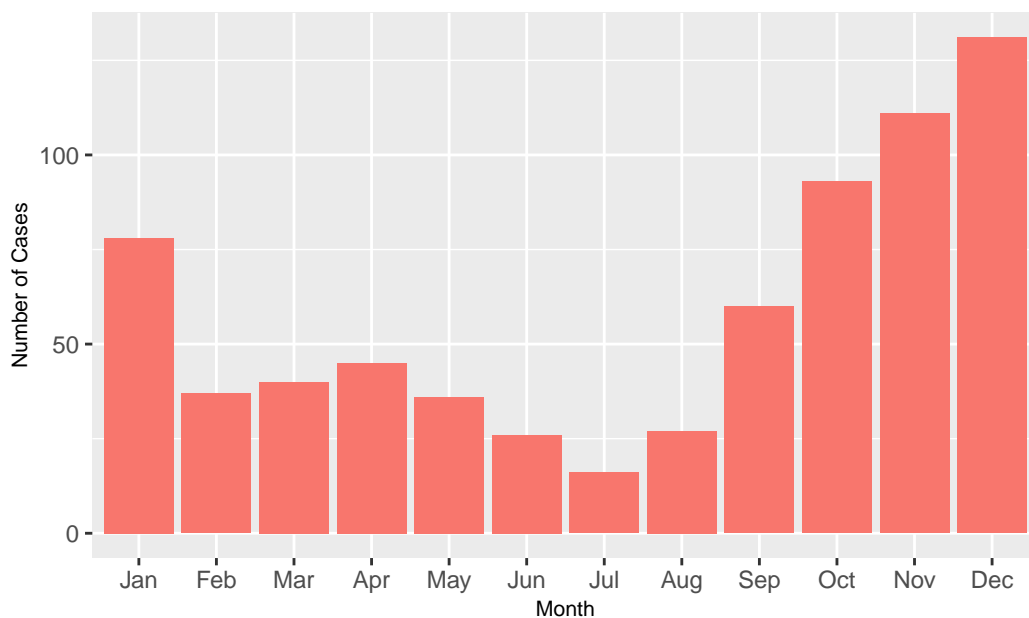
We first begin by plotting the number of cases contributed by each of the 18 unique diseases responsible for outbreaks in 2023. The “Pending” category has also been included and the following histogram is obtained.

Figure 1: Number of Cases by Causative Agent-1 in 2023



It can be observed in Figure 1, that COVID-19 was the highest contributor to outbreaks in 2023 by far, with exactly 700 out of the total 1066 outbreaks (or 65.66%) in Ontario. Further investigation can be done to observe the spread of COVID-19 cases throughout the year as follows:

Figure 2: Number of COVID-19 Cases per Month in 2023

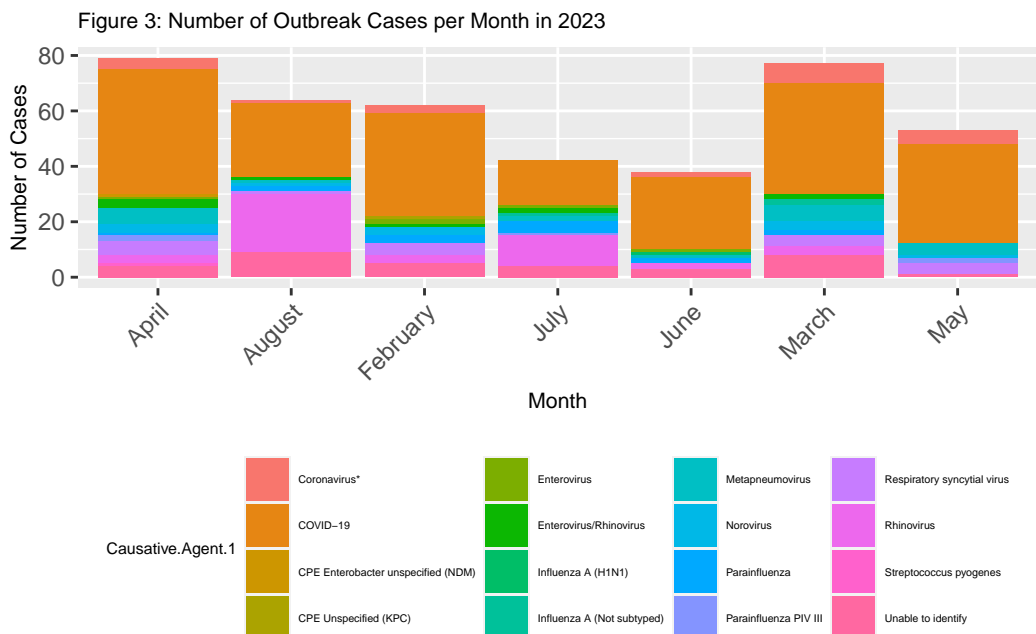


It can be observed in Figure 2, that most of the COVID-19 outbreaks occurred around the

start of Winter towards the end of the year. The data is left skewed, and the maximum number of outbreaks (131) was recorded in December. That being said, there is a local peak of 78 cases in January.

Although the number of COVID-19 outbreaks starts to increase from September, it may still be the highest contributor towards outbreaks in months where the total number of cases is relatively mild in comparison.

Thus, detailed breakdown of outbreaks attributed to the 19 categories of diseases (including Pending,) within healthcare institutions between the months of February and August (ordered alphabetically) can be seen below:



It can be seen in Figure 3, that even among months where COVID-19 was seemingly not spiking (i.e in the middle of the year) it still made up the majority percentage of all outbreaks within those months, i.e it was the highest contributor as shown by the plot above.

4 Conclusion

We can thus conclude that healthcare institutions in Ontario have their work cut out for themselves if they wish to reduce the number of outbreaks that occur moving forward. This may be accomplished by adding more posters on hygiene and masking etiquette in and around the institutions, adding safety screen shields at any and all help desks, and enforcing both medical staff and patients to wear face shields, or face masks at all times.

References

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