Outbreak Management in Toronto Health Institutions*

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Outbreak management has always been one of the most important mission for healthcare institutions, not only to prevent transmissions of diseases/illnesses but also to protect public health. Especially in the COVID-19 era, outbreak response and management is considered as the top priority in healthcare institution operation. This paper discusses the big picture of outbreak management in Toronto health institutions from 2020 to 2022, as well as pointing out the relationship between healthcare setting, outbreak type and outbreak response.

1 Introduction

In the previous years, a lot has been learned with regards to the COVID-19 pandemic. With the unprecedented cases increase of different diseases, the responsibility for outbreak response and management in healthcare institutions has become more important than ever before. Outbreak management helps stop the further transmission of illnesses/diseases by identifying the source and implementing control measures.

In order to protect and improve public health, the Toronto Public Health works with healthcare institutions to prevent and control institutional outbreaks, including the use of best practices in infection prevention control. Healthcare institutions are required to monitor staff and patients/residents for signs and symptoms of gastroenteric and respiratory infections under the Ontario Health Protection and Promotion Act (HPPA) (Gelfand (2022)). The institutions must also actively seek, detect and report suspected and/or confirmed outbreaks to their local public health unit.

In the following paper, I will delve into the Outbreaks in Toronto Healthcare Institutions in the previous years to shed light on the differences and trends in reacting to outbreaks.According to opendatatoronto (Gelfand 2022), an outbreak is defined as "a localized increase (e.g. in an institution, or a specific ward or floor within an institution) in the rate of infection or illness, above that which is expected." I will first guide you through the data collection and analyzing process, which will be explained thoroughly in Section 2. Then I will visualize the data and explain the implications of the data, finally draw some limitations and conclusions of this data set.

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*Code and data are available at: https://github.com/julieenguyennn/Outbreak-Management-in-Toronto-Health-Institutions

2 Data

2.1 Source

All the data used in this paper was obtained from the City of Toronto Open Data Portal and is titled "Outbreaks in Toronto Healthcare Institutions". The dataset is published by Toronto Public Health and is refreshed weekly, with the lastest refresh on Jan 19, 2023. The data provided on the portal include subsets of data from the year 2003 to the time of writing, which is 2023. For each year, the dataset displays each observation's details, namely:

1. Outbreak setting: the type of facility, in terms of the type of healthcare provided

2. Type of Outbreak: The mode of transmission classification description of the outbreak

3. Causative & Etiological Agent: the aetiological agent(s) that have been identified from one or more outbreak-related cases

4. Date Outbreak Began & Date Declared Over

5. Active Status

6. Institution Name & Address

2.2 Methodology

Based on the dataset, I first generated some questions that this paper aim to answer to gain a better understanding of outbreak management over the COVIC-19 in Toronto health institutions, specifically:

(1) What type of outbreak was the most encountered by the institutions during the period?
(2) Which setting was more prone to expect an outbreak?
(3) How was the response rate for each type of outbreak in each setting?

In order to answer those questions, I chose the 03 dataset that lies in the COVID-19 era - 2020, 2021, and 2022, to analyze, compare, and contrast.

During the process, all the necessary libraries and packages, tidyverse (Wickham et al. 2019), janitor (Firke 2021), ggplot2 (Wickham 2016), RColorBrewer (Neuwirth 2022), and kableExtra (Zhu 2021), are utilised.

3 Discussion

To comprehend the context, I first observed the total cases that were recorded. Throughout the period, there was a total of 2080 cases reported to experience an outbreak, with a surge from 2021 to 2022. In particular, Toronto health institutions underwent 553 cases in 2020, 394 cases in 2021, and 1133 cases in 2022. ((**ref?**)(tab:no_outbreak))

Table 1: Total number of outbreaks from 2020 - 2022

Year	No. of Outbreak
2020	553
2021	394
2022	1133

Looking deeper into these outbreaks, it is obvious that Respiratory diseases remain the major type of outbreak throughout the period, with a surge of approximately 700 cases from 2021 to 2022. While Enteric and other types of outbreak only account for a very small proportion of the outbreaks in total, these two types also remain constant throughout the period. See @ for illustration.
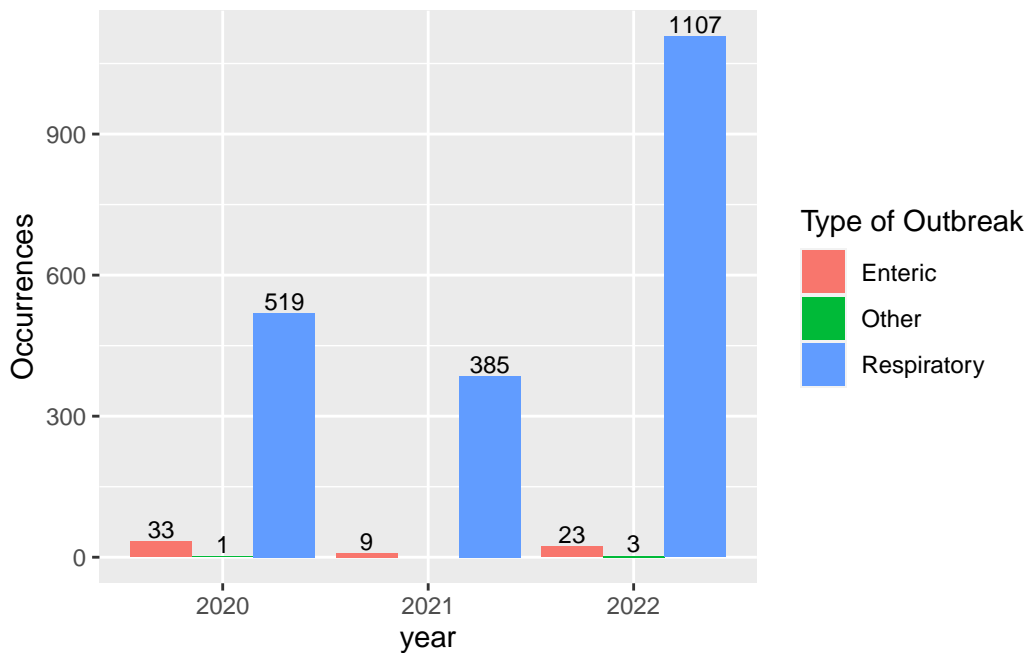

Figure 1: Outbreaks occured in 2020 - 2022 by type

When examining the correlation between the outbreak type and the setting, it is noticed that the majority of outbreaks happened in Long-term Care Housings (LTCH). In 2020, those LTCHs witnessed 20 cases of Enteric outbreak and 296 cases of Respiratory outbreak. In 2021, the number of outbreak dropped down to 187 cases in both type, while that of in 2022 increased to more than 450 cases. A notable detail to point out is that other types of outbreak only occurred in the Acute Care division of the hospitals. In 2022, Toronto also encountered the emergence of outbreak in Transitional Care with 9 cases.

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Table 2: The number cases of outbreak by setting from 2020 - 2022

	2020	2021	2022
Enteric			
Hospital-Acute Care	6	NA	NA
Hospital-Chronic Care	1	NA	NA
LTCH	20	7	18
Retirement Home	6	2	5
Other			
Hospital-Acute Care	1	NA	3
Respiratory			
Hospital-Acute Care	75	102	245
Hospital-Chronic Care	48	47	177
Hospital-Psychiatric	9	3	17
LTCH	296	180	459
Retirement Home	91	53	200
Transitional Care	NA	NA	9

4 Conclusion

Reference

Firke, Sam. 2021. *Janitor: Simple Tools for Examining and Cleaning Dirty Data.* https://CRAN.R-project.org/package=janitor.

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