Covid 19, Sources of Infection in Toronto*

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Abstract

Sources of infection are an important part of constructing health and safety guidelines concerning the ongoing Covid 19 pandemic in Toronto. We obtain data regarding the sources of infection and episode dates in the Toronto area and analyze it. We find that over time Community and Household contact have decreased and the primary source of recent infection is Healthcare Institutions and large congregation. These findings have implications for deterrmining public health and safety for prevention of further infections.

1   Introduction

The source of infections is an important factor in determining which measures are appropriate for attempting to alleviate the spread of Covid 19. Most common sources found in this dataset were household contact and community infections, however over the course of the the last 2 years this has changed.

We analyzed the source and episode date of infections in the Toronto area during the pandemic. With (Figure 1 1 as well as (Figure 2 2), we can determine that the absolute greatest source of infection throughout the pandemic so far has been community and hourshold infections. However recently outbreaks in healthcare institutions as well has public congregations has been growing.

The implications of this data are relevant to public health guidelines. It can be useful for making recommendations regarding what activities people may or may not want to participate in and inform the public of where infections are occuring. It may also be relevant to determining any restrictions City of Toronto may want to put in place should that be necessary.

First we'll look at a snapshot of the data being analyzed in (Table 1 **??**(tab:dataextract)), then we will see a breakdown of the different sources of infection and their relative proprtion in (Figure 1 1) and (Table 2 2). Lastly we can look at how different sources of the infection contributed to the spread of Covid 19 in (Figure 22).

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*Code and data are available at: https://github.com/InfyQL/Paper1

2 Data

Data provided from the City of Toronto via the 'opendatatoronto' package, (Gelfand 2020) and R language (R Core Team 2020), along with tidyverse (Wickham et al. 2019), knitr (Xie 2021), kableExtra (Zhu 2021), and dplyr (Wickham et al. 2021) for document construction and producing tables and figures used. The dataset includes the sources of infection with Covid 19 and the episode date. Because we are only concerned with known sources of infection, we have removed the cases where source of infection was either pending or had no information. The data is collected via the Case & Contact Management System and organized by Toronto Public Health and is updated on a weekly basis. It includes both confirmed cases of Covid 19 as well as reported cases which are subject to ongoing investigation. We are analyzing the data associated with the source of infection along with the episode date, not the reported date of infection.

Showing sample of dataset, (Table 1).

Table 1: First ten rows of a dataset on source of Covid 19 infection Toronto

Source of Infection	Episode Date
Household Contact	2020-09-16
Close Contact	2020-09-14
Close Contact	2020-09-17
Community	2020-09-19
Household Contact	2020-09-16
Travel	2020-09-13
Close Contact	2020-09-16
Household Contact	2020-09-14
Close Contact	2020-09-14
Outbreaks, Other Settings	2020-09-17

First wee look at the total for each source of infection throughout the entire Covid 19 pandemic and their proportion. We note that the largest contributors overall have been community and household infections.

Table 2: Proportion of Sources of Infection

Source of Infection	counts	prop
Community	63829	43
Household Contact	36793	25
Close Contact	15476	10
Outbreaks, Healthcare Institutions	15660	10
Outbreaks, Other Settings	10440	7
Travel	3810	3
Outbreaks, Congregate Settings	4117	3

Outbreaks associated with congregation and travel were the smallest contributors to infection and the largest being community and household contact with 43% and 25% of the total infections respectively. Below we will see a visual representation of these proportions in (Figure 1 @ref(fig: Chart1))
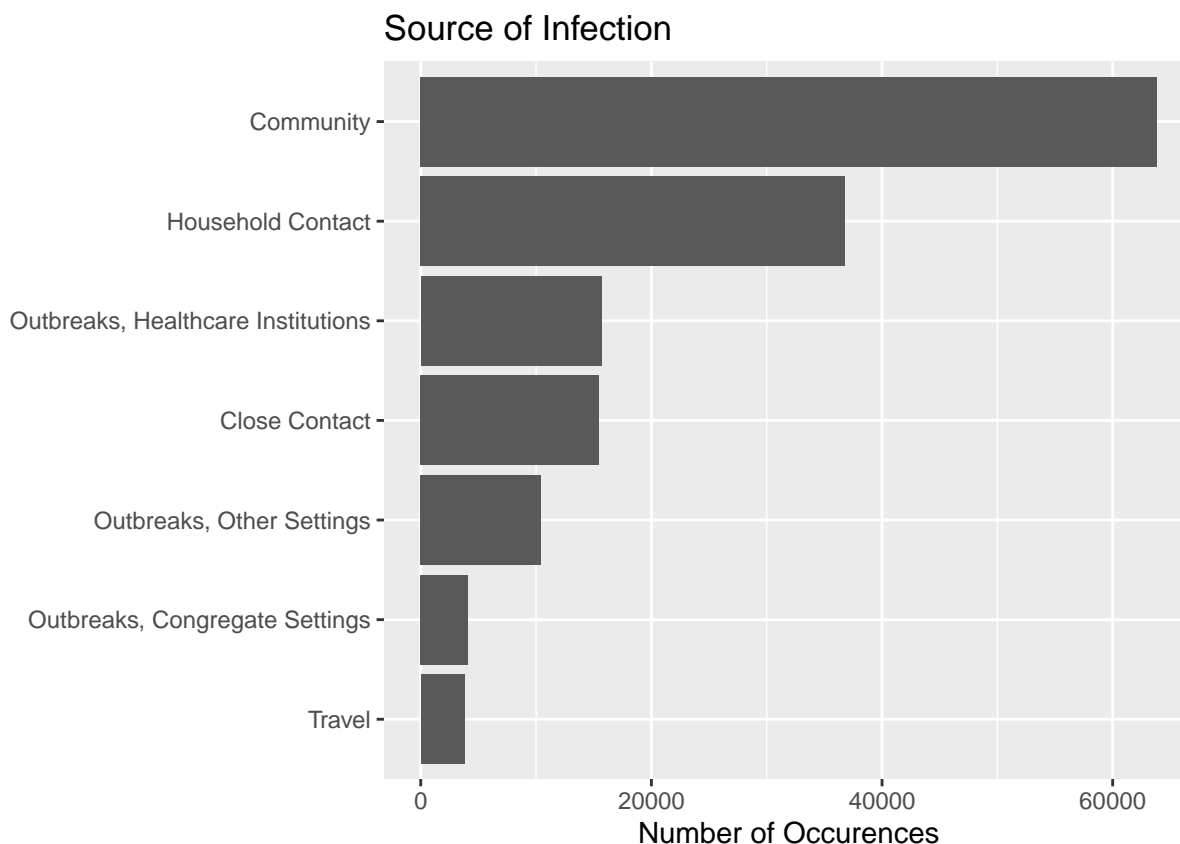

Figure 1:

The total sources of infection are useful for analyzing the ares which have been of greatest concern for most of the spread, though they do not address fully the present concerns. It does however suggest that issues of travel have not been and should not be a concern for the City of Toronto when considering how to address the pandemic.

We are interested in how different sources of infection change over time during the Covid 19 pandemic. We can see in (Figure 2 2) how the different sources of infection have changed from the start of the pandemic.
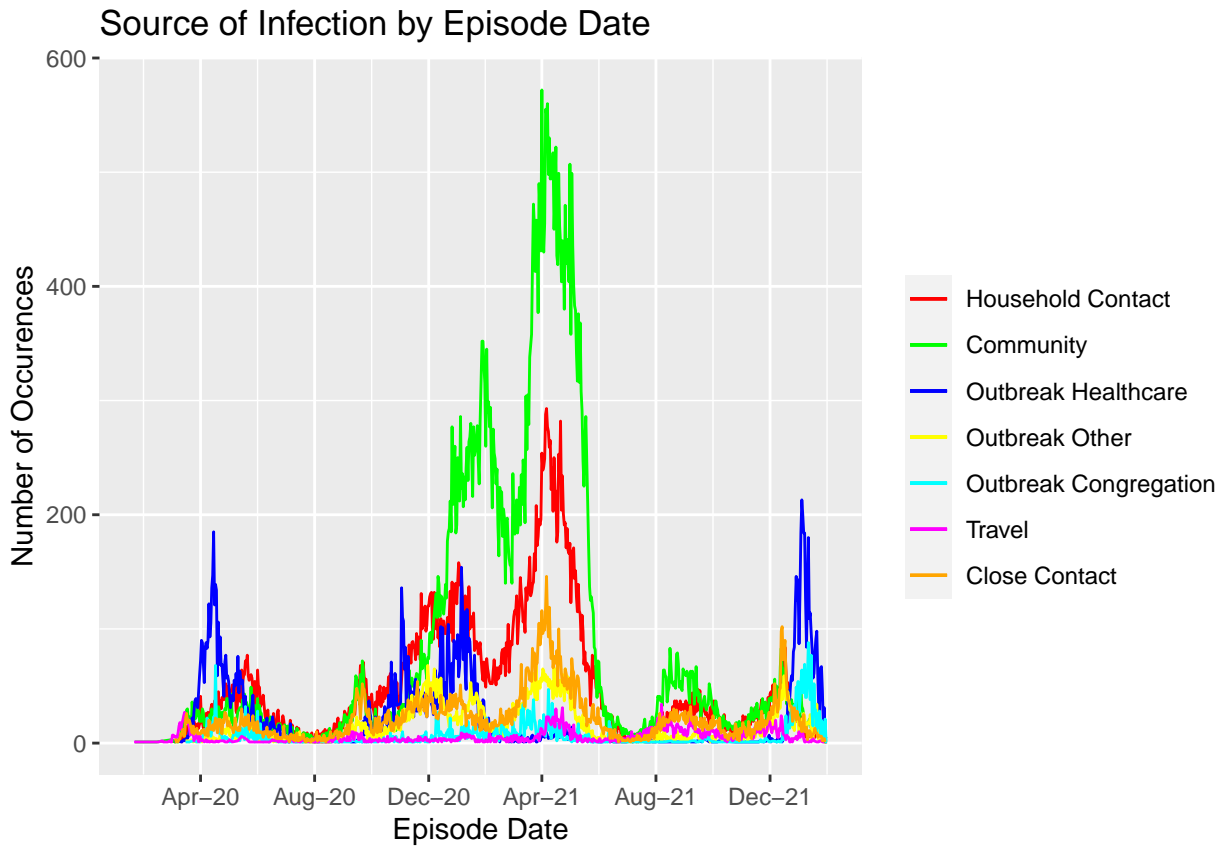

Figure 2: Figure 2.

By (Figure 2 2, we can see throughout the peak of the pandemic in 2021 and in agreement with the earlier (Table 22), Community and Household contact were the primary sources of infection throughout Toronto. However more recently the primary source of infection have become Outbreaks in congregations and healthcare institutions. This finding is not particularly surprising as restrictions regarding public access to densely populated areas have loosened in recent times along with limits on capacity in public gatherings. The reduction in infections through the community and household contacts is promising for the loosening of such restrictions however outbreaks in healthcare institutions may suggest a need for more support of healthcare institutions to aleviate outbreaks.

References

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