Appendix 3 Segmented Poisson regression model

Model setup and interpretation:

The study cohort comprised Ontario adult residents who were diagnosed with cancer between January 3, 2016 and November 7, 2020 (253 weeks). Each patient was followed for 1 year after date of cancer diagnosis to determine the modality of first cancer treatment received (surgery, chemotherapy, radiation, or no treatment). For each modality, we used a segmented Poisson regression model with standard parametrization to study the trend in weekly first cancer treatment recipient volume (over the next year) per thousand cancer patients (i.e., rate of treatment).

$$\ln(y_i) = b_0 + b_1 * t_i + b_2 * I(t_i \geq T) + b_3 * I(t_i \geq T) * (t_i - T + 1) + \ln\left(\frac{\text{PatientDay}_i}{7}\right)$$

y_i = number of patients receiving a cancer diagnosis during week i (i = 1, 2, …, 253) who would receive a particular modality of first cancer treatment over the next year.
t_i = weekly index (1, 2, …, 253)
$I(t_i \geq T)$ = a dummy variable indicating the pandemic vs. pre-pandemic period, using the index of week March 15-21, 2020 (T) as the start of COVID-19. Hence, this variable = 0 if week i is before the week of March 15-21, 2020 (pre-pandemic period), otherwise equals to 1 (pandemic period).
$\ln\left(\frac{\text{PatientDay}_i}{7}\right)$ = offset of the model (denominator of rates = total number of patient-weeks)

Hence, the estimated regression parameters $b_0 \sim b_3$ can be interpreted as the following:

$1000 * e^{b_0}$ = mean rate of receiving a modality of first cancer treatment within the next year for patients diagnosed at week 0 (the week before January 3, 2016).

e^{b_1} = weekly trend over the entire study period (slope), i.e., for each weekly increase, the rate of receiving a modality of first treatment within the next year for patients diagnosed in this week = e^{b_1} * rate of receiving the same treatment modality for those diagnosed in the week prior.

e^{b_2} = change in mean rate of receiving this first cancer treatment modality over the next year for patients diagnosed with cancer at the start of the pandemic (during the week of March 15, 2020) compared to those diagnosed in the previous week.

e^{b_3} = change in slope in the pandemic period, i.e., for each weekly increase during the pandemic, the rate of receiving this first cancer treatment modality for patients diagnosed with cancer in this week = $e^{b_1+b_3} *$ rate of treatment among patients diagnosed in the week prior.

Test for overdispersion:

For each segmented Poisson regression model, we reported the Deviance and Pearson Chi-square over degree of freedom (249). Overdispersion was ruled out as these numbers are all close to 1.

Treatment being modelled	**Deviance/DF**	**Pearson Chi-square/DF**
Surgery	1.0924	1.0769
Chemotherapy	1.0077	1.0091
Radiation	0.8638	0.8680
No treatment	1.3347	1.3408