Supplement 1. Lists of participating centers in Cancer in Young People - Canada

Center	Location	Local CYP-C Principal Investigator
Alberta Children's Hospital	Calgary, Alberta	Dr. Tony Truong
Allan Blair Cancer Centre	Regina, Saskatchewan	Dr. Saima Alvi/Dr. Riaz Alvi
British Columbia Children's Hospital	Vancouver, British Columbia	Dr. Caron Strahlendorf
CancerCare Manitoba	Winnipeg, Manitoba	Dr. Sara Israels
Children's Hospital of Eastern Ontario	Ottawa, Ontario	Dr. Donna Johnston
CHU de Québec – Université Laval	Quebec City, Quebec	Dr. Valérie Larouche
CHU de Sherbrooke	Sherbrooke, Quebec	Dr. Josée Brossard
CHU Sainte-Justine	Montreal, Quebec	Dr. Henrique Bittencourt
Hospital for Sick Children	Toronto, Ontario	Dr. Lillian Sung/ Dr. Jim Whitlock
IWK Health Centre	Halifax, Nova Scotia	Dr. Ketan Kulkarni
Janeway Children's Health & Rehabilitation Centre	St John's, Newfoundland	Dr. Lynette Bowes
Kingston General Hospital	Kingston, Ontario	Dr. Laura Wheaton
Children's Hospital, London Health	London, Ontario	Dr. Alexandra Zorzi
McMaster University	Hamilton, Ontario	Dr. Carol Portwine
Montreal Children's Hospital	Montreal, Quebec	Dr. David Mitchell
Saskatoon Cancer Centre	Saskatoon, Saskatchewan	Dr. Saima Alva/Dr. Riaz Alvi
Stollery Children's Hospital	Edmonton, Alberta	Dr. Bev Wilson

Appendix 1, as supplied by the authors. Appendix to: Pelland-Marcotte M-C, Xie L, Barber R, et al. Incidence of childhood cancer in Canada during the COVID-19 pandemic. *CMAJ* 2021. doi: 10.1503/cmaj.210659.

Supplement 2. Methodological principles of the interventional autoregressive integrated moving average model

The autoregressive integrated moving average (ARIMA) method considers the link of the current value with the past values of the time series, and its stochastic components to forecast future values. The general multiplicative ARIMA model which is denoted as ARIMA *(p, d, q)(P, D, Q)*$_s$[1-3] can be written as

$$\varphi_p(B)\Phi_P(B^s)(1-B)^d(1-B^s)^D y_t = C + \theta_q(B)\Theta_Q(B^s)\varepsilon_t ,$$

where, y_t is the observed value at time *t*. *B* is the backshift operator $By_t = y_{t-1}$. ε_t is the value of the random error at time *t* which is assumed to be independently and normally distributed with a zero mean and constant variance. *C* is a constant which determines the "level" of the process, *s* denotes the number of seasons, e.g., *s* = 12 for monthly data. $\varphi_p(B) = 1 - \varphi_1 B - \cdots - \varphi_p B^p$ is the nonseasonal autoregressive (AR) polynomial, where *p* is the order of nonseasonal AR which represents the number of immediately preceding *y* values y_{t-1}, y_{t-2}, …, y_{t-p} that generate the current value of y_t in the model. $\Phi_P(B^s) = 1 - \Phi_1 B^s - \Phi_2 B^{2s} \ldots - \Phi_P B^{Ps}$ denotes the seasonal AR operator. $\theta_q(B) = 1 - \theta_1 B - \cdots - \theta_q B^q$ is the nonseasonal moving average (MA) polynomial, where *q* is the order of nonseasonal MA which refers to the number of lagged values for the error term. $\Theta_Q(B^s) = 1 - \Theta_1 B^s - \cdots - \Theta_Q B^{Qs}$ is the seasonal MA polynomial. $(1-B)^d(1-B^s)^D$ indicates nonseasonal differencing (subtracting the previous value from the current value) of order *d* and seasonal differencing of order *D* to make the time series stationary. When seasonality is not presented, the multiplicative ARIMA *(p,d,q)* model becomes $\varphi_p(B)(1-B)^d y_t = C + \theta_q(B)\varepsilon_t$.

The ARIMA modeling involves five iterative steps: 1) Identify trends, stationarity and seasonality through visual examination of the plots of time series, autocorrelation function (ACF) and partial autocorrelation function (PACF) and using the augmented Dickey Fuller stationary test, and then if needed, make series stationery by data transformation such as differencing of the time series; 2) find out tentative combinations of *p*, *d* and *q* by visual inspection of the ACF and PACF plots and further filtration by combining the results of diagnostic statistics including the smallest canonical correlation, minimum information criterion

and extended sample autocorrelation function; 3) Estimate the coefficients of the selected models using exact maximum likelihood algorithm; 4) Perform diagnostic checking to choose the best model which should have the minimum Akaike's information criterion or Schwarz-Bayesian information criteria and normally distributed residuals with a zero mean and constant variance; 5) Forecast using the fitted model.

To examine changes in the monthly observed ASIRs in the pandemic period compared with the projected in the hypothetical continuation of the trends in pre-pandemic period of March 2016 to February 2020, we performed interrupted time series analysis with the ARIMA model.[3] The COVID-19 impact was evaluated by the changes in the level (a step change) and trend (slope) of the ASIRs.[4-6] The step change indicator variable, x_{1t}, takes a value of 1 for every month during the pandemic period and 0 prior to the start of the pandemic period, i.e., March 2020. The intervention variable, representing a gradual change in slope of the ASIRs, x_{2t}, takes 0 for every month prior to March 2020 and increases by 1 after March 2020. The intervention ARIMA model has the form

$$ASIR_t = \omega_1 x_{1t} + \omega_2 x_{2t} + n_t ,$$

where $ASIR_t$ represents the effects of the intervention in terms of the deterministic input series x_{1t} and x_{2t}, and n_t, an error or noise part, represents the ARIMA *(p, d, q)(P, D, Q)$_s$* process as described above. The interventional ARIMA *(p, d, q)(P, D, Q)$_s$* model selection for each study cohort (by cancer type or geographic area) was done for including the step change variable x_{1t} only and for including both the level shift x_{1t} and slop change x_{2t}variables in the models. The most appropriate impact indicator variables were selected by using the Akaike's information criterion and the Schwarz-Bayesian information criteria. The selected ARIMA *(p, d, q)(P, D, Q)$_s$* model was applied to the pre-pandemic period of March 2016 to February 2020 only to project the ASIRs in the absence of a pandemic.

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Supplementary Table S1. Quarterly age-standardized incidence rates per million among children <15 years of age between December 2017 and August 2020

	BASELINE MEDIAN		COVID-19 PANDEMIC				INCIDENCE RATE RATIO OF ASIRS (PANDEMIC/BASELINE MEDIAN)		
	DEC17-FEB20		MAR-MAY20	JUN-AUG20	SEP-NOV20		MAR-MAY20	JUN-AUG20	SEP-NOV20
All cancers combined	158,4		157,7	164,6	148,0		1.00 (0.83– 1.19)	1.04 (0.87– 1.24)	0.93 (0.78– 1.12)
Sex									
Males	173,7		167,7	194,1	151,6		0.97 (0.76– 1.23)	1.12 (0.88– 1.41)	0.87 (0.68– 1.12)
Females	149,5		147,2	133,5	144,1		0.98 (0.75– 1.29)	0.89 (0.68– 1.17)	0.96 (0.74– 1.26)
Age (in years)									
<1	265,0		312,9	309,0	253,9		1.18 (0.69– 2.01)	1.17 (0.68– 1.99)	0.96 (0.55– 1.68)
1 to 4	220,1		228,1	242,7	217,6		1.04 (0.77– 1.39)	1.10 (0.82– 1.48)	0.99 (0.73– 1.34)
5 to 9	121,3		97,8	95,9	109,7		0.81 (0.56– 1.17)	0.79 (0.54– 1.15)	0.90 (0.63– 1.30)
10 to 14	131,1		127,9	139,0	108,0		0.98 (0.69– 1.37)	1.06 (0.76– 1.48)	0.82 (0.58– 1.18)
Region									
Atlantic	152,1		177,6	123,1	201,4		1.17 (0.55– 2.46)	0.81 (0.35– 1.85)	1.32 (0.64– 2.73)
Quebec	166,4		151,0	167,8	131,0		0.91 (0.62– 1.33)	1.01 (0.69– 1.46)	0.79 (0.53– 1.17)
Ontario	168,5		162,7	169,8	153,1		0.97 (0.72– 1.29)	1.01 (0.76– 1.34)	0.91 (0.68– 1.22)
Prairies	144,6		173,6	184,1	163,5		1.20 (0.82– 1.77)	1.27 (0.87– 1.87)	1.13 (0.76– 1.67)
British Columbia	142,9		108,4	133,2	113,6		0.76 (0.42– 1.38)	0.93 (0.53– 1.64)	0.79 (0.44– 1.43)
Cancer type									
I Leukemias	50,1		49,0	59,5	49,1		0.98 (0.71– 1.35)	1.19 (0.87– 1.62)	0.98 (0.71– 1.36)
II Lymphomas	18,8		22,0	28,9	17,9		1.17 (0.71– 1.93)	1.54 (0.96– 2.47)	0.95 (0.56– 1.62)
III CNS	39,5		35,4	30,2	35,3		0.89 (0.62– 1.30)	0.76 (0.52– 1.13)	0.89 (0.62– 1.29)
IV Neuroblastoma	12,5		13,8	11,3	11,0		1.10 (0.58– 2.08)	0.90 (0.46– 1.76)	0.87 (0.45– 1.72)
V Retinoblastoma	2,1		2,7	4,9	3,5		1.29 (0.29– 5.75)	2.30 (0.59– 8.90)	1.66 (0.40– 6.96)
VI Renal tumors	7,3		9,5	7,5	8,3		1.30 (0.59– 2.86)	1.03 (0.45– 2.38)	1.14 (0.50– 2.58)
VII Hepatic tumors	4,2		2,8	4,8	3,5		0.67 (0.19– 2.38)	1.15 (0.39– 3.42)	0.83 (0.25– 2.74)
VIII Bone tumors	6,1		4,7	3,3	4,5		0.77 (0.29– 2.07)	0.54 (0.18– 1.61)	0.74 (0.28– 1.99)
IX Soft tissue sarcomas	9,3		5,9	11,0	8,8		0.63 (0.27– 1.46)	1.18 (0.57– 2.41)	0.95 (0.44– 2.01)
X Germ cell tumors	6,1		7,4	2,6	2,7		1.21 (0.50– 2.92)	0.43 (0.13– 1.38)	0.44 (0.13– 1.42)
XI Carcinomas[a]	5,5		4,0	0,7	2,7		0.73 (0.25– 2.10)	0.12 (0.02– 0.96)	0.49 (0.15– 1.63)
XII Others	0,7		0,7	0,0	0,7		0.95 (0.06–15.25)	0.00 (–)	1.02 (0.06–16.34)

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[a] Include the following diagnoses: adrenocortical carcinomas, thyroid carcinomas, nasopharyngeal carcinomas, malignant melanomas, skin carcinomas and other and unspecified carcinomas.

Abbreviations: ASIR: age-standardized incidence rates; CNS: central nervous system

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