

Preserving the Supply of Type O Rh(D) Negative Red Blood Cells by Re-defining the Maximum Age at which Ontario Women are Considered to be of Child-bearing Potential

Introduction

The demand for type O Rh(D) negative (O neg) red blood cells (RBC) often exceeds the supply, resulting in a frequent shortage of this blood type. While 6 to 7% of the population is blood type O neg, a disproportionate 10% of Canadian Blood Services (CBS) donors are of this blood type, due to active efforts on behalf of CBS to recruit and retain them. Hospitals, however, request that 11.5% of their RBC stock be O neg (1). This places a strain on the limited supply of O neg RBC in Canada.

Patients requiring transfusion prior to the determination of their ABO and Rh(D) type must receive type O RBC. Because of the high immunogenicity of the Rh(D) antigen, and the potential risk of hemolytic disease of the fetus and newborn, female children and women of “child-bearing potential” should receive type O neg RBC if emergency transfusion is required (2,3). Transfusion medicine lists from the Choosing Wisely® and Choosing Wisely Canada campaigns (www.choosingwisely.org and www.choosingwiselycanada.org), and the National Advisory Committee on Blood and Blood Products (www.nacblood.ca) recommend that O neg RBC should be reserved for O neg patients, and for women of child-bearing potential with an unknown blood type and requiring emergency RBC transfusion.

The maximum age used to define child-bearing potential varies between hospitals throughout Ontario. This study was performed to assist hospitals in determining the age of child-bearing potential in their respective LHINs, using a national health information database.

Methods

The Canadian Institute for Health Information (CIHI) publishes on its website (www.cihi.ca) information about the maternal age of Canadian residents, and combines all women aged 40 years and older into one group. The CIHI was contracted by ORBCoN to provide more granular data for Ontario women aged 40 years and older, and to provide this information for each Ontario Local Health Integration Network (LHIN). The data shown in this report include in-hospital live births in Ontario according to the LHIN in which the delivery occurred. Data for the fiscal years (FY) 2013-2014 to 2017-2018 are used. This is an update to two previous reports.

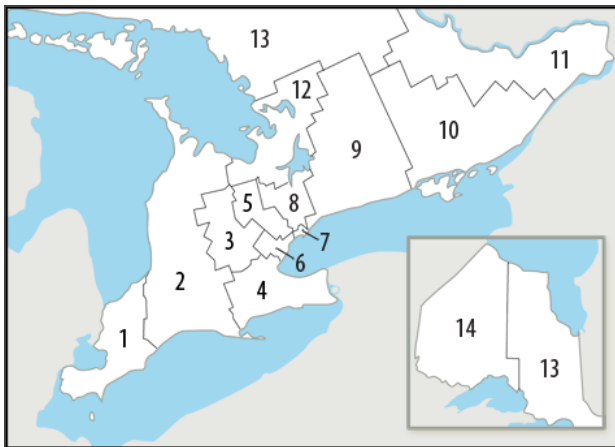
The cumulative percentage of all births at each maternal age cut-off was determined for each LHIN. Trends in maternal age over time were also determined for selected LHINs and for Ontario (data not shown here, see the accompanying slide deck).



Results

Figure 1 shows the location of each Ontario LHIN. The name of each LHIN is shown in Table 1.

Figure1. Ontario Local Health Integration Networks (LHINs)



There were 657,537 in-hospital live births in Ontario in fiscal years FY2013-2014 to FY2017-2018. Of these, 629,552 (95.7%) were to women age 39 years and younger, 656,418 (99.8%) were to women age 45 years and younger, and 1,119 (0.2%) were to women over the age of 45 years. Table 1 shows the number of births in each LHIN according to maternal age. Some data points have been hidden to conform to the CIHI data release rules as described in the caption under Table 1. Table 2 shows the highest maternal age cut-off required to capture 99.5% of births in each LHIN.



Table 1. Births by maternal age in each Ontario LHIN: FY2011-2014 to FY2015-2018

LHIN		Maternal Age (years)													Total >45
		≤39	40	41	42	43	44	45	46	47	48	49	50	>50	
1	Erie St. Clair	27175	266	168	103	68	44	18	5	5	6	*	*	*	22
2	South West	45510	463	305	173	102	69	20	21	*	6	*	*	*	36
3	Waterloo Wellington	35896	443	285	177	109	52	23	12	6	*	*	*	6	31
4	Hamilton Niagara Haldimand Brant	61488	772	577	372	201	107	50	31	14	14	6	5	9	79
5	Central West	38722	577	365	233	146	57	34	31	20	*	9	5	8	**
6	Mississauga Halton	54317	1117	788	450	287	167	77	42	24	9	13	5	8	101
7	Toronto Central	86761	2498	1712	1091	744	390	249	150	88	47	35	28	42	390
8	Central	77952	1698	1108	735	444	271	117	71	38	18	8	8	12	155
9	Central East	61047	853	576	343	232	112	58	30	13	10	*	7	6	**
10	South East	19220	182	120	64	54	16	8	*	*	*	0	*	*	8
11	Champlain	66781	1091	726	488	305	155	78	56	25	14	10	7	9	121
12	North Simcoe Muskoka	18835	201	147	72	46	22	14	14	*	*	0	*	*	20
13	North East	24270	138	109	56	46	12	7	*	*	0	*	0	*	5
14	North West	11578	83	59	36	19	11	5	*	*	*	0	*	0	6

* Data value is 1, 2, 3, or 4. The CIHI data release rules do not allow publically-accessible tables to show these data values in order to prevent the identification of individuals.

** Because a single data value is disallowed by the CIHI data release rules, this derived value must also be hidden in order prevent the identification of individuals.



Table 2. Maternal age cut-off required to capture 99.5% of births

LHIN	99.5% maternal age cut-off	LHIN	99.5% maternal age cut-off
Erie St. Clair	43	Central	44
South West	42	Central East	43
Waterloo Wellington	43	South East	42
Hamilton Niagara Haldimand Brant	43	Champlain	44
Central West	43	North Simcoe Muskoka	43
Mississauga Halton	44	North East	42
Toronto Central	45	North West	42

Maternal age trends, for ages 40 to 45 inclusive, were also examined for FY2013-2014 to FY2017-2018. The Ontario data is shown in Table 3. See the accompanying slide deck for selected LHIN data. Data for some LHINs cannot be shown due to the CIHI data release rules, as described in the caption under Table 1.

Table 3. Maternal age trends in Ontario 2013-2014 to 2017-2018

	FY13-14	FY14-15	FY15-16	FY17-17	FY17-18
age 40	2012	2037	2124	2045	2164
age 41	1416	1334	1394	1414	1487
age 42	916	875	834	882	886
age 43	536	538	587	561	581
age 44	268	294	304	306	313
age 45	141	156	160	131	170

There were 108 births to women over age 50 in Ontario from FY2013-2014 to FY2017-2018, accounting for 0.016% of total births. Forty two (39%) of the 108 were in the Toronto Central LHIN, possibly due to the location of high-risk pregnancy units there.



Discussion

Based on data from the Canadian Institute for Health Information, the age at which Ontario women should be considered to be of child-bearing potential, and thus eligible for receipt of O neg RBC in an emergency situation, may safely be lowered to 45 years or less because only 0.2% of in-hospital births are to women older than 45 years. Some institutions have already done this, based on their own data (4).

Individual institutions will determine their own policies for issuing O neg RBC, based on their local demographics, and following discussion at their Transfusion Committee. Hospitals using an age cut-off of greater than 45 years as a definition of child-bearing potential may wish to use the information provided here to review their current policies. There is an opportunity for preservation of the limited type O negative red blood cell supply for patients who truly need it.

References:

1. Webert K. Blood Brief: An Update on O neg. June 2018. Canadian Blood Services. www.blood.ca
2. Blood and blood components. Canadian Standards Association CAN/CSA-Z902-15; 2015. Section 10.9.3.1.
3. Standards for Hospital Transfusion Services. Canadian Society for Transfusion Medicine v4; 2017. 5.3.7.4.4.
4. Bhella S, Gerrard L, Lin Y, Rizoli S, and Callum J. Obstetric and trauma database review at a single institution finds the optimal maternal age restriction for the transfusion of O- blood to women involved in trauma to be 45 years. *Transfusion* 2012;52:2488-2489.

Disclaimer:

Parts of this material are based on data and information provided by the Canadian Institute for Health Information. However, the analyses, conclusions, opinions and statements expressed therein are those of the author and not those of the Canadian Institute for Health Information.

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