DIAGNOSTIC SERVICES

ONTARIO

YEAR IN REVIEW

JANUARY – DECEMBER (2019)

Diagnostic Services “Year in Review” statistics are based on a January to December calendar year. The calendar year provides better correlation with Health Canada birth statistics.

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RED CELL SEROLOGY REFERENCE LABORATORY

The Red Cell Serology Reference Laboratory, Ontario Diagnostic Services provides testing for hospitals in the Central Ontario Region and Hamilton Region, and for private laboratories. Hospital patients who are repeatedly transfused may develop red cell antibodies and as a result may have difficulty in tolerating transfusions. Diagnostic Services has specialized and experienced technologists that assist and provide consultation to hospital transfusion medicine laboratories. The Reference Laboratory identifies red cell antibodies and provides transfusion recommendations. Diagnostic Services has a varied selection of specialized procedures and rare reagents to resolve more difficult red cell antibody cases. Staff within our department may collaborate with other references laboratories such as the National Immunohematology Reference Laboratory (NIRL), Grifols Clinical Laboratory & Immunohematology Center and the New York Blood Center.

Diagnostic Services Red Cell Antibody Investigations

In 2019, hospitals have referred 1,107 requests for red cell antibody identification.

Referring hospitals have different capabilities and expertise in resolving red cell antibody investigations. Some hospitals have limited reagents for antibody identification or phenotyping of patient or donor units. Others have access to a wider variety of reagent red cell panels and methods as well as on site immunohematology expertise. A few hospital transfusion medicine laboratories have the resources to resolve the majority of serological problems and send only complex investigations for additional serological or genotyping studies.

Canadian Blood Services, Diagnostic Services provides consultation and testing support including antibody investigation, advanced or alternative techniques where required, and recommendations for compatibility testing methods and selection of appropriate donor unit phenotypes if necessary.

Reporting may include interim, final and supplemental reports, depending on the urgency of the testing, the need for patient transfusion and the complexity of investigation.

Testing Performed

The Red Cell Reference Laboratory routinely performs the following tests:

- ABO/Rh blood type and discrepancy investigations (if required)
- Screen for red blood cell antibodies
- Antibody Identification, if antibodies are detected

- Phenotyping (patient)
- Direct Antiglobulin Test
- Elution and Adsorption
- Other tests and techniques, as required.

Serological samples submitted for testing are categorized into either “Prenatal Samples” or “Patient Samples”.

Antibody Screening and identification is routinely performed using a Gel Card testing methodology. A combination of Gel Card testing methodology and indirect antiglobulin tube testing using saline, enzymes or PEG enhancement are the most common antibody identification methods.

The laboratory also coordinates Red Cell Genotyping referral through the Canadian Blood Services National Immunohematology Reference Laboratory (NIRL). The Brampton laboratory is also responsible for maintaining the Central Ontario Sickle Cell Registry.

1.1. Specimens Tested

The data in this report reflects a calendar year period to enable better correlation to other government statistical data (Statistics Canada birth statistics).

Table 1: Specimens Tested

Ontario

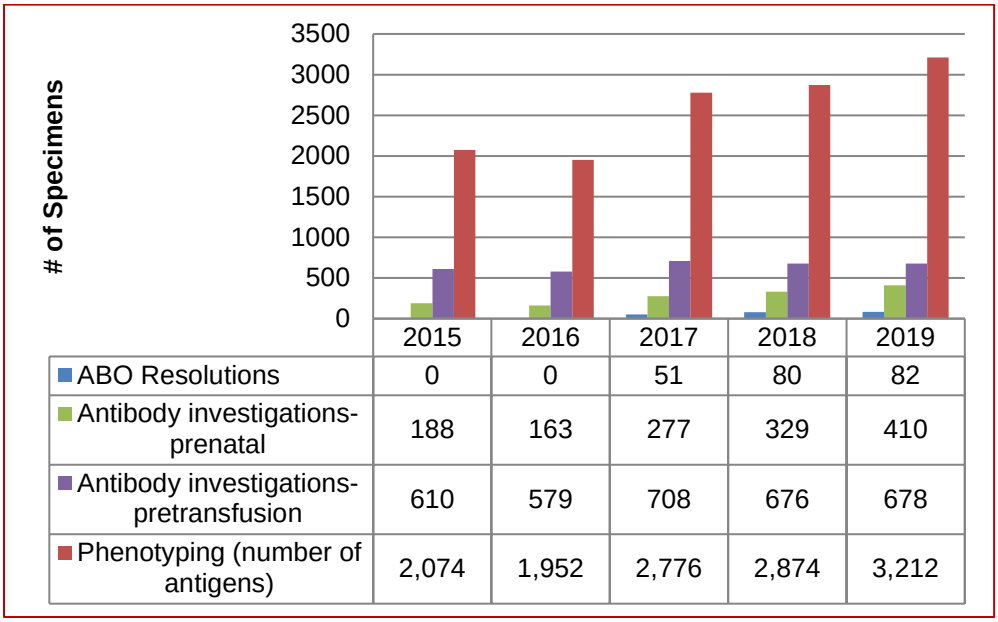
Specimen Type	Test Type	2015	2016	2017	2018	2019
Patient Samples for Red Cell Serology Reference and Prenatal Samples	ABO Resolutions	0	0	51	80	82
	Antibody investigations-pretransfusion	610	579	708	676	678
	Antibody investigations-prenatal	188	163	277	329	410
	Phenotyping (number of antigens)	2,074	1,952	2,776	2,874	3,212
Total # of Specimens Tested		**2,872**	**2,694**	**3,812**	**3,959**	**4,382**
Total # of Patients Tested		728	716	670	987	**1,107**

Table 2: Samples Received Each Month

Sample Type	19-Jan	19-Feb	19-Mar	19-Apr	19-May	19-Jun	19-Jul	19-Aug	19-Sep	19-Oct	19-Nov	19-Dec
Patient	59	53	60	77	76	73	55	69	49	58	60	51
Prenatal	16	19	24	34	45	40	45	30	35	28	25	26

The sample total for antibody investigations is 1,107 samples in 12 months or an average of 92 samples per month.

Figure 1: Specimens Tested



	2015	2016	2017	2018	2019
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Phenotyping (number of antigens)	2,074	1,952	2,776	2,874	3,212

Hospital/Private Laboratory Referrals:

Samples referred into the Brampton Diagnostic Services Laboratory are from:

- 62 Health Care Facilities
- 3 Private Labs (Alpha, LifeLabs and Med-Health)

Private Labs are referring in primarily prenatal samples (90%) with only 10% patient samples for antibody investigation.

Table 3: Total Number Samples sent from Hospital/Private Laboratories

Alpha Laboratories Inc.	Prenatal	118	136	
	Patient	18		
LifeLabs	Prenatal	87	87	
	Patient	0		
Med-Health Laboratories Inc.	Prenatal	57	64	
	Patient	7		
			249	**Totals**
			224	**Prenatal**
			25	**Patient**

The hospital laboratories are referring in a combination of patient and prenatal samples for investigation.

Table 4: Total Number Samples with No Antibodies Detected

Prenatal	Patient	Total
51	87	138

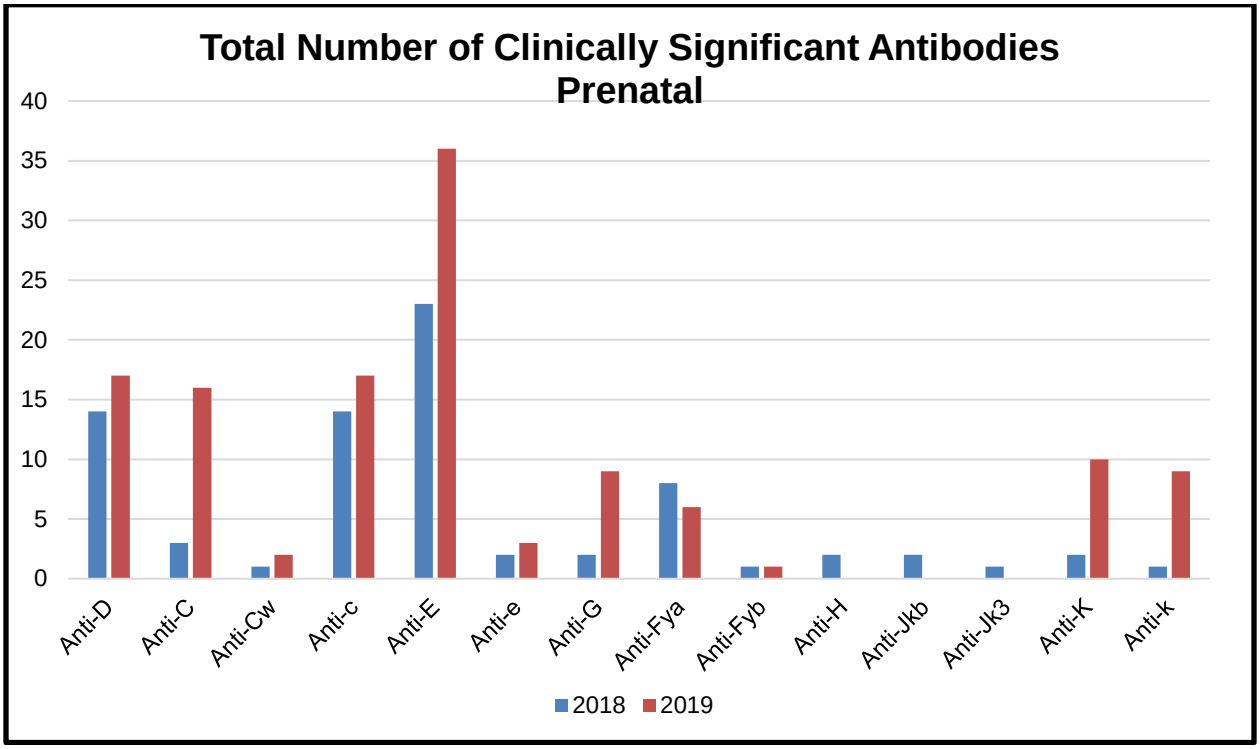
Table 5: Total Number of Antibodies Detected in Prenatal Samples

Number of Prenatal Investigation for each Antibody		
Clinically Significant Antibodies - Identified	**2018**	**2019**
Anti-D	14	17
Anti-C	3	16
Anti-Cw	1	2
Anti-c	14	17
Anti-E	23	36
Anti-e	2	3
Anti-G	2	9
Anti-Fya	8	6
Anti-Fyb	1	1
Anti-H	2	0
Anti-Jka	12	10
Anti-Jkb	2	0
Anti-Jk3	1	0
Anti-K	2	10
Anti-k	1	9
Anti-Lub	1	5
Anti-M *	21	39
Anti-S	3	6
Anti-U	1	0
Anti-Vel	1	0
Anti-Wra	1	0
Total	**116**	**216**

*Note: only IgG anti M is clinically significant in pregnancy

Clinically Insignificant Antibodies	2018	2019
Anti-Ch	2	0
Anti-Cob	1	0
Anti-Lea	13	14
Anti-Leb	6	8
Anti-P1	3	3
Anti-Rg	2	1
Anti-Yta	3	0
Autoantibody	12	8
Antibody to HLA Antigens	12	9
Cold Agglutinin	21	11
Unidentified	14	2
Passive Anti-D	69	43
Antibody to low prevalence antigen	2	1
TOTAL: Clinically Insignificant Antibodies	**160**	**100**

Figure 2: Total Number of Antibodies Detected in Prenatal Samples



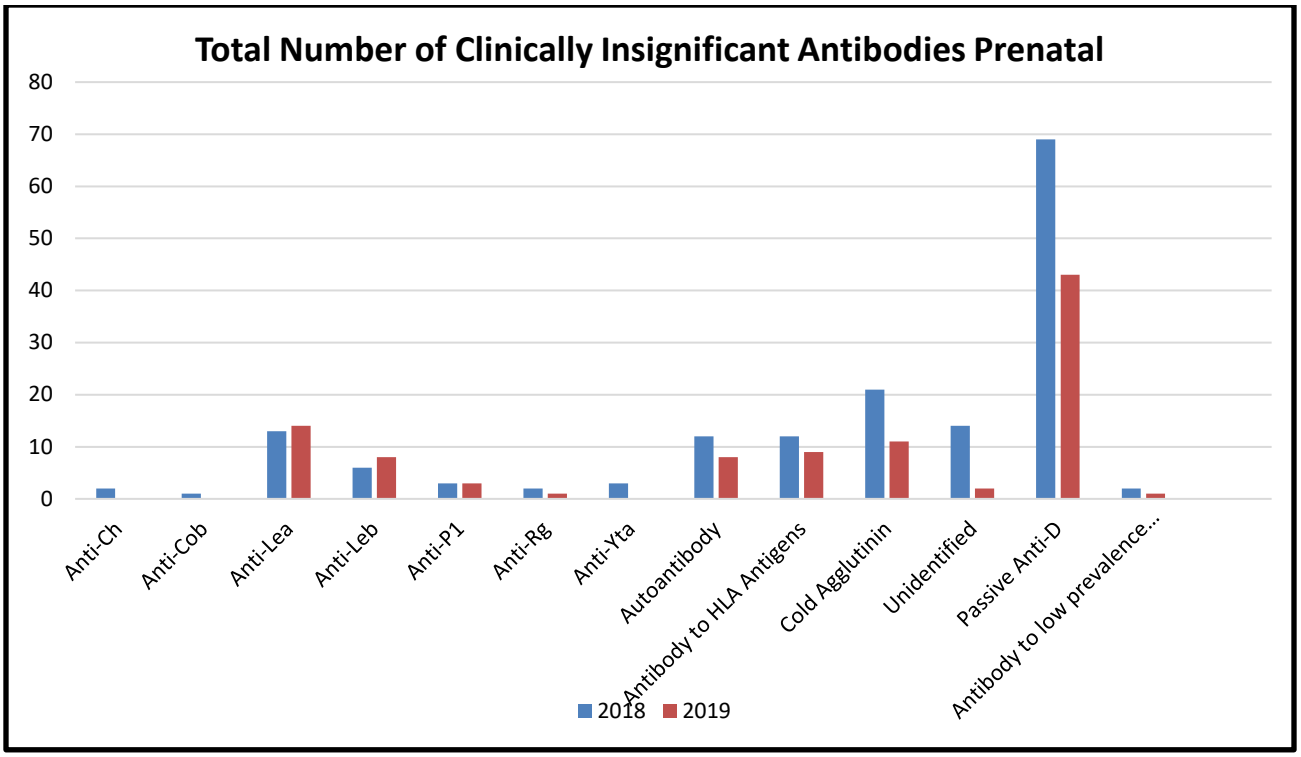


Figure 3: Frequency of Clinically Significant Antibodies

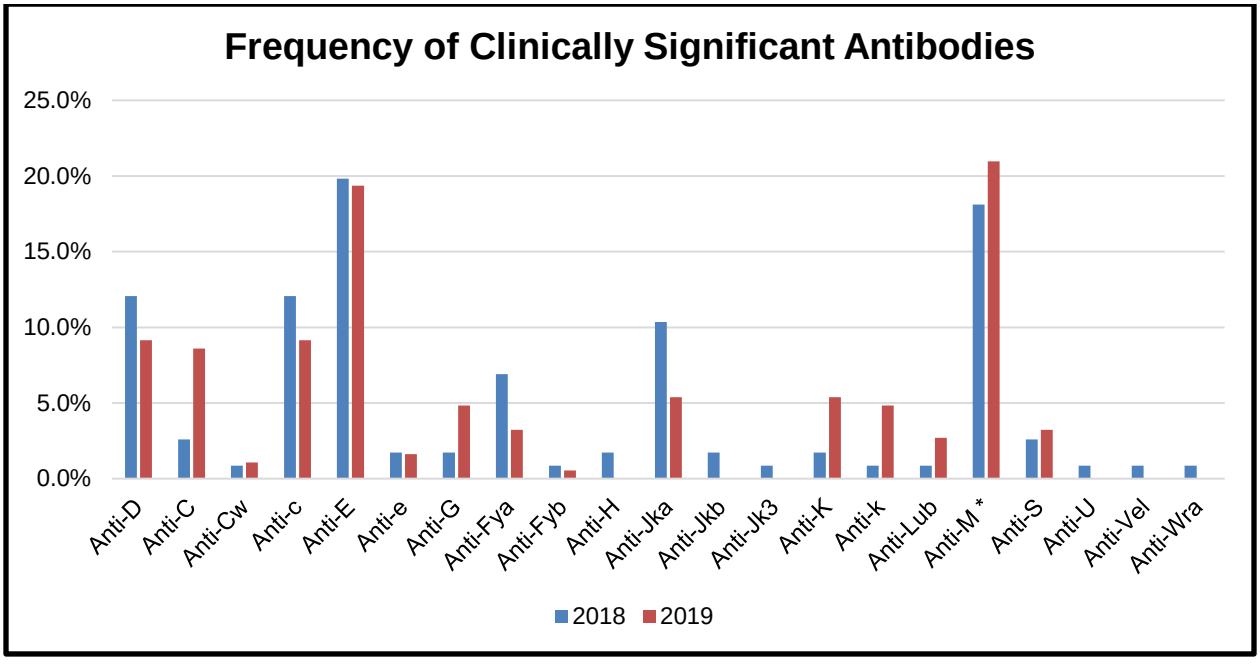


Table 6: Prenatal Combination Antibodies

Summary: In 2019 there were 40 antibody investigations for multiple antibodies with 26 different antibody combinations examined.

Multiple Antibody Combinations Identified	Number of Prenatal Multiple Antibody Investigation in (2019)
Anti-c, Anti-E	2
Anti-c, Anti-Fya	1
Anti-C, Anti-G	1
Anti-c, Anti-E, Anti-Fya	1
Anti-c, Anti-E, Anti-Jka	3
Anti-c, Antibody to HLA related antigen	1
Anti-C, Anti-D, cold agglutinin	1
Anti-C, Anti-E, anti-D	1
anti-Fya, cold agglutinin	2
Anti-D Anti-G	3
Anti-D, Anti-M	1
anti-M, anti-S, anti-Fya, cold agglutinin	1
Anti-E, Anti-c, Anti-Jka	1
Anti-E, Passive D	1
Anti-E, Autoantibody, Passive D	1
Anti-Fya, Anti-M, Anti-S, cold agglutinin	2
Anti-Fya, passive D	1
Anti-Jka, Anti-Lea	1
Anti-Jka, Passive D	2
Anti-Jka, Anti-S, Autoantibody	1
Anti-Jka, Antibody to HLA antigen, Passive D	1
Anti-Jkb, autoantibody	1
Anti-Lea, Anti-Leb	3
Anti-M, Antibody to HLA antigen	2
Anti-K, Unidentified antibody	1
Antibody to HLA related antigen & Passive D	4

Table 7: Perinatal Patient Antibody Titres

Antibody	Critical Level	Non-Critical Level	Non-Critical to Critical
Anti-D	3	18	0
Anti-C	1	1	0
Anti-c	2	4	0
Anti-E	2	17	0
Anti-E, anti-c	2	2	0
Anti-Fya	4	2	0
Anti-Jka	2	3	0
Anti-U	0	2	0
anti-k	2	0	0
anti-Lub	0	2	0
anti-C, anti-G	2	2	1
anti-D, anti-G	2	2	0
anti-M	0	10	0
Anti-S	1	3	0
anti-D, Anti-C	1	3	0

Table 8: Number of Investigations for Antibodies Detected in Patient Reference Samples

Common Clinically Significant Antibodies in Patient Reference Samples	2019
Anti-D	33
Anti-C	45
Anti-c	39
Anti-E	99
Anti-e	17
Anti-f	2
Anti-G	3
Anti-K	38
Anti-M	12
Anti-S	30
Anti-s	3
Anti-Fya	25
Anti-Fyb	4
Anti-Jka	21
Anti-Jkb	10
TOTAL:	381

Clinically Insignificant Antibodies	2019
Anti-A1	5
Anti-Kna	0
Anti-Lea	3
Anti-Leb	2
Anti-McCa	1
Anti-N	1
Anti-P1	2
Anti-Rg	2
Anti-Sda	2
Anti-Yka	0
Anti-Yta	2
Autoantibody	213
Antibody to HLA Antigens	16
Cold Agglutinin	56
Unidentified	12
TOTAL: Clinically Insignificant Antibodies	**299**

Figure 4: Total Number of Clinically Significant Antibodies Detected in Patient Reference Samples

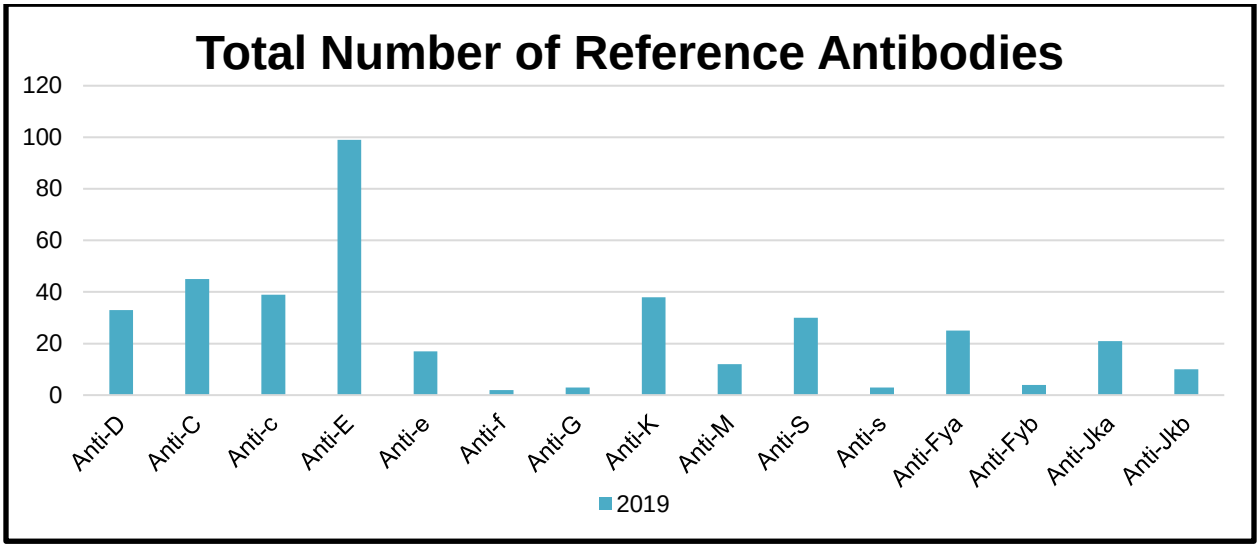


Figure 5: Frequency of Clinically Significant Antibodies in Patient Reference Samples (2019)

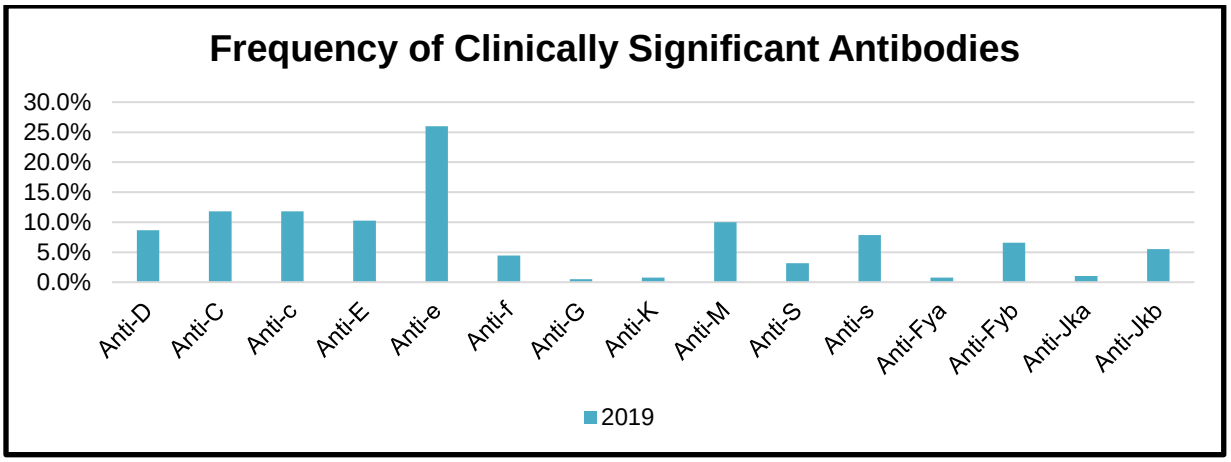


Table 9: Number of Investigations for Antibodies to Low Prevalence Antigens

Antibody	Number Identified
Anti-Cw	2
Anti-Dia	2
Anti-Jsa	1
Anti-Lua	4
Anti-Lu14	1
Anti-Kpa	2
Anti-Mia	1
Anti-SC2	3
Anti-V	4
Anti-Wra	7
Anti-Ytb	2
Antibody to low prevalence antigen	7

Table 10: Number of investigations for Antibodies to High Prevalence Antigens

Antibody	Number Identified
Anti-Ch	4
Anti-Coa	1
Anti-hrB	1
Anti-Jk3	1
Anti-k	2
Anti-Jsb	1
Anti-Kpb	1
Anti-Lub	4
Anti-LWa	2

Table 11: Number of Patient Investigation for a Combination Antibodies

Multiple Antibodies Detected	2019	Multiple Antibodies Detected	2019
Anti-D & HLA Related Antibody	1	Anti-C, Anti-Fya, Autoantibody	3
Anti-D Anti-C	4	Anti-C, Anti-e, Anti-Jka	1
Anti-D, Anti-M	2	Anti-C, Anti-K, Autoantibody	2
Anti-D, Antibody to Low Prevalence Antigen	4	Anti-C, Anti-Fya, Anti-K, Anti-V	1
Anti-D, Anti-G	2	Anti-C, Anti-E, Anti-Jka, Anti-K	1
Anti-D, Autoantibody	1	Anti-C, Anti-E, Anti-S, Anti-V, Autoantibody	1
Anti-D, Anti-E	2	Anti-c, Anti-Cw	1
Anti-D, Anti-Fya	1	Anti-c, Anti-Fya	2
Anti-D, Anti-Wra	1	Anti-c, Anti-K	2
Anti-D, Anti-C, Anti-Sc2	1	Anti-c, Anti-S	2
Anti-D, Anti-C, Anti-K	1	Anti-c, Anti-Jka, Autoantibody	1
Anti-D, Anti-K, & HLA Related Antibody	1	Anti-c, Anti-Jkb, cold agglutinin	1
Anti-D, Anti-C, Anti-Jka	1	Anti-c, Anti-K, Autoantibody	1
Anti-D, Anti-E, Autoantibody	1	Anti-c, Anti-Lub, Anti-K	2
Anti-D, Anti-C, Anti-E, Autoantibody	1	Anti-c, Anti-Lua, Anti-S	1
Anti-D, Anti-C, Anti-K, Anti-Lua	1	Anti-e, Anti-Fya	1
Anti-C, Autoantibody	6	Anti-e, Anti-M	1
Anti-C, Anti-e	2	Anti-E, Autoantibody	15
Anti-C, Anti-Fya	1	Anti-E, Anti-c	4
Anti-C, Anti-G	4	Anti-E, Anti-Cw	1
Anti-C, Anti-Kpa	1	Anti-E, Antibody to an HLA related antigen	1

Multiple Antibodies Detected	2019	Multiple Antibodies Detected	2019
Anti-C, Anti-e, Autoantibody	3	Anti-E, Anti-K	2
Anti-C, Anti-Jka, Autoantibody	2	Anti-E, Anti-Kpa	2
Anti-E, Anti-Kpb	1	Anti-S, Anti-Jkb, Anti-K	1
Anti-E, Anti-Rg	1	Anti-S, Anti-Fya, Anti-Jkb, Anti-Leb	1
Anti-E, Anti-S	1	Anti-Lea, Anti-Leb	7
Anti-E, Autoantibody, Antibody to HLA related antigen	1	Anti-K, Autoantibody	4
Anti-E, Anti-c, Autoantibody	6	Anti-K, Cold Agglutinin	1
Anti-E, Anti-c, Anti-Cw	1	Anti-K, Anti-Ch	1
Anti-E, Anti-Cw, Anti-Fyb	1	Ant-K, Anti-Jka	2
Anti-E, Anti-c, Anti-Jka	2	Anti-K, Anti-Jkb	3
Anti-E, Anti-c, Anti-S	3	Anti-K, Anti-Lua	1
Anti-E, Autoantibody, Cold Agglutinin	1	Anti-K, Antibody related to HLA Antigen	1
Anti-E, Anti-Cw, Autoantibody	1	Anti-K, Unidentified Antibody	1
Anti-E, Anti-Fya, Anti-K	1	Anti-K, Autoantibody, Antibody related to HLA Antigen	1
Anti-E, Anti-Fya, Anti-Yta	1	Anti-K, Autoantibody, Cold Agglutinin	1
Anti-E, Anti-Fyb, Autoantibody	1	Anti-K, Anti-Fyb, Cold Agglutinin	1
Anti-E, Anti-Jka, Autoantibody	2	Anti-K, Anti-Jka, Cold Agglutinin	1
Anti-E, Anti-K, Anti-Lua	1	Anti-K, Anti-Kpa, Anti-Wra	2
Anti-E, Anti-K, Anti-Jkb	2	Anti-K, Anti-Fyb, Anti-Lua, Antibody to Low Prevalence Antigen	1
Anti-E, Anti-Lea, Anti-Leb	1	Anti-K, Anti-Kpa, Anti-Wra, Antibody related to HLA Antigen	2
Anti-E, Anti-S, Autoantibody	1	Anti-Kpa, Antibody related to HLA Antigen	1
Anti-E, Anti-c, Anti-Cw, Anti-K	1	Anti-Kpa, Anti-Jsa, Anti-Wra	1
Anti-E, Anti-c, Anti-Fya, Antibody related to HLA Antigen	1	Anti-Lua, autoantibody	1
Anti-E, Anti-c, Anti-Fya, Anti-Ytb	1	Anti-Lub, Anti-Fya	1
Anti-E, Anti-c, Anti-Kpa, Anti-S	1	Anti-Fya, Anti-Coa	1
Anti-E, Anti-Dia, Anti-K, Anti-Wra	1	Anti-Fya, Antibody to Low Prevalence Antigen	2
Anti-E, Anti-Fya, Anti-M, Anti-S	1	Anti-Jka, Autoantibody	1
Anti-E, Anti-Fyb, Anti-Jka, Anti-Lua	1	Anti-Jkb, Cold Agglutinin	1
Anti-M, Cold Agglutinin	3	Anti-Dia, Cold Agglutinin	3
Anti-M, Anti-Jka	1	Anti-Wra, Cold Agglutinin	2
Anti-M, Anti-K	1	Anti-Wra, Passive D	1
Anti-S, Autoantibody	2	Anti-Wra, Antibody to Low Prevalence Antigen	1

Multiple Antibodies Detected	2019	Multiple Antibodies Detected	2019
Anti-Ytb, Antibody related to HLA Antigen	1	Anti-Sda, Cold Agglutinin	1
Anti-D & HLA Related Antibody	1	Anti-C, Anti-Fya, Autoantibody	3

Summary: In 2019 there were 193 antibody investigations for multiple antibodies with 186 different antibody combinations examined.

Table 12: Antibody Complex Procedures Performed

Procedures	Number of Prenatal Samples	Number of Referral Samples
Alloadsorption	0	65
Autoadsorption	9	238
Elution	6	182
Direct Coombs	397	710

REFERRAL SAMPLES

1.2. Red Cell Genotyping

The BioArray BeadChip™ test system has been installed and validated in the Diagnostic Services Laboratory in Edmonton for RHD genotype testing used for the identification of RHD variants. The Edmonton CBS laboratory is accredited by the College of Physicians and Surgeons of Alberta (CPSA). Any patient samples requiring extended red cell genotype testing other than for D variant are referred to the National Immunohematology Reference Laboratory (NIRL) in Ottawa. NIRL performs extended genotype testing using the Progenika ID Core XT™ assay. If genotype test results are required urgently, testing results can be provided within 24 hours of the sample receipt.

Table 13: Genotype procedures referred by Canadian Blood Services

Number of Ontario Genotype Procedures 2019	
Procedures	**Number**
RHD Genotype Procedures	163
Non-RHD Genotyping	774

1.3. Red Cell Serological Reference Testing

The National Immunohematology Reference Laboratory (NIRL) in Ottawa is a highly specialized laboratory that focuses its attention on the identification and resolution of exceedingly complex red cell transfusion-related problems. The laboratory is accredited by the Institute of Quality Management in Healthcare (IQMH).

QUALITY INDICATORS

The laboratories monitor many quality indicators and the two which are most relevant to this document are turnaround times and rejected specimens which are presented below.

1.4. Turnaround Times

To ensure timely reporting of patient test results, Canadian Blood Services monitors turnaround time (TAT) from when the specimen is received at Canadian Blood Services in Brampton to the time when the results are available. Since monitoring of this quality indicator began in 2008, the percentage of specimens has consistently exceeded the predefined TAT threshold of 75% of samples to be tested and reported within 5 days of receipt. In 2019, 77% of the samples received were tested and reported within 5 days of receipt. Samples whose testing exceed the expected TAT are usually those where complex clinically significant antibodies are detected or where a referral to the National Immunohematology Reference Laboratory for additional investigation or genotype testing is required.

1.5. Rejected Specimens

The laboratory reserves the right to refuse improperly labelled specimens. Consistent practices for specimen rejection are employed across CBS. The laboratory takes measures to maintain specimen integrity during the process of following up on the receipt of an improperly identified specimen. The high number of specimens received by the laboratory makes it impossible to positively identify specimens that are not clearly labelled in accordance with standard specimen identification criteria. The specimen rejection rate in 2019 was 2.1% which is decreased from the 3.1% in 2018.

1.6. Proficiency Testing

- **College of American Pathologists Survey Participation**
  This summary is based on all the College of American Pathologists (CAP) survey reports from the Brampton Diagnostic Services site. This summary includes all the blood group serology processes.

Table 14: CAP Proficiency Testing Results

Brampton Diagnostic Site (Red Cell)	2017 CAP Proficiency Results	2018 CAP Proficiency Results	2019 CAP Proficiency Results
ABO/Rh Type	100%	100%	100%
Antibody Titre	100%	100%	100%
Antibody Identification	100%	100%	100%
Antibody Identification Eluate	100%	100%	100%
Direct Coombs C3	100%	100%	100%
Direct Coombs IgG	100%	100%	100%
Unexpected Antibody Detected	100%	100%	100%

Table 15: IQMH Proficiency Testing Results

Brampton: QPMLS TMED	Kit #	Date Results Received	Results
Brampton	TMED-1903A Advanced	2019-04-03	100%
Brampton	TMED-1905A Advanced	2019-07-23	100%
Brampton	TMED-1909A Advanced	2019-11-12	100%

DIAGNOSTIC SERVICES UPDATE 2019

Updates pertain to all Diagnostic Services sites within Canadian Blood Services: Vancouver, Edmonton, Winnipeg and Brampton

ALL CBS Diagnostic Services Sites	**Implementation of eTraceline Nov 2019**: eTraceline was implemented at all CBS reference laboratory sites in November 2019.
	Implementation of Antigen Plus April 2019 Antigen Plus, a program to allow development of panels from reagent cell collections was implemented along with a review and re organization of the reference lab inventory of rare reagent red cells and antisera.
	Perinatal Advisory Committee The PNAC continues to collaborate throughout the year and at an annual November meeting. The group reviewed and discussed an ongoing project related to the titration of multiple antibodies using cells with both antigens represented versus the standard method involving separate titrations of each antibody. An update of the plans for repatriation of Saskatchewan patient samples to a provincial hospital-based program was provided and a collaborative study to compare titer levels using the Saline IAT method at CBS vs the automated gel titration method in the Saskatchewan perinatal program was discussed. A review of the form used for notification of Intra uterine transfusion by the BC maternal fetal medicine group was provided Results of the recent Canada wide survey distributed to perinatal testing labs by the Canadian Obstetrical Perinatal network were reviewed and discussed. A project in the Manitoba Red Cell Serology lab involving development of a new process for preparing aliquots of red cell units for neonatal transfusion was described. New interpretive reporting comments for specimens with features suggesting Fetal /neonatal Alloimmune thrombocytopenia were discussed.

ALL CBS Diagnostic Services Sites	**DBL Novaclone Testing (NCT) on all Rh Negative Perinatal Patients Implemented 2019-01-29** CBS DS sites incorporated NCT testing into their prenatal RhD algorithm for all patients who test RhD negative on the NEO analyzer. NCT testing identifies a group of Rh prenatal patients not eligible for RhIG, who might have been typed as Rh negative based on initial NEO testing and results in a decrease in unnecessary RhIG prophylaxis.
	Critical Anti-M titre – Implemented 2019-11-04 Dithiothreitol (DTT) plasma treatment for critical anti-M titres was implemented at all Diagnostic Services Sites to determine if critical titre is due to IgG or IgM:2019-11-04 DTT is used to inhibit IgM antibody activity which allows for detection of underlying IgG antibodies. Procedure is performed on prenatal patients with a critical anti-M titre ($\geq$ 16) to determine the immunoglobulin class and the risk of HDFN. If the antibody is predominately IgG there is greater risk of HDFN and the mother is referred to the Maternal Fetal Medicine Clinic if the titre remains at $\geq$ 16 after the DTT plasma treatment.
Brampton	**Patient Genotype Testing Implemented 2019:** Reference lab testing of patients' samples for genotyping using the Grifols Progenika Core XT platform was implemented in the CBS Brampton reference laboratory in 2019.
	Transition of National Immunohematology Reference laboratory from Ottawa to Brampton site: The NIRL moved location from Ottawa to CBS Brampton
Vancouver /Edmonton	**Ortho MTS Gel Workstation and Pipettes Implemented 2019** Ortho MTS Gel workstations were implemented in the Vancouver and Edmonton Diagnostic Services Laboratories as a supplementary method to help complete antibody cases referred in from hospitals.
	Passive Anti-D Testing by NEO Cap-R Ready ID Implemented 2019-01-29 Vancouver and Edmonton Diagnostic Services Laboratories modified their Passive Anti-D testing platform from manual PEGIAT method to automated Capture R testing using the NEO analyzer. Automated testing provides a reduction in cost and decreased time to complete passive anti-D identification (which represents > 40% of perinatal antibody investigations), positive sample ID and reduces the risk of transcription errors.
Winnipeg	Collaboration with Shared Health Diagnostics to ensure the Diagnostic Services Business Continuity plan meshes seamlessly with other plans was a focus in 2019.
	College of American Pathologists (CAP) Laboratory Accreditation An on-site inspection of the Platelet Immunology Laboratory occurred with the lab successfully being granted accreditation. in the beginning of 2019.

	LEAN Continuous Improvement of Red Cell Serology Laboratories – Staff Cross Training Cross-training of staff to perform both pre-transfusion and perinatal testing continued in 2019. The goal is to more efficiently use people's talents.
	Preparation of Red Cell Aliquots for Neonatal and Pediatric Transfusion The project team for aliquoting smaller, patient appropriate doses of red cells for neonate and pediatric transfusion worked in 2019. The process was implemented on January 27, 2020.
	Process Change for the Distribution of Components in eTraceline In collaboration with Shared Health Diagnostics, the process for distribution of blood components to eTraceline facilities changed from using the Reserve/Transfer function to the Reserve/Issue function. This change was implemented on September 16, 2020. This change is a quality improvement initiative to reduce distribution errors by utilizing the broader functionality of the Issue program

Presentations / Abstracts / Publications Listing
D Lane, R Fallis, B Herdman, A Kabani, C Musuka, L Grabner. **Implementation of Electronic Solution to Reduce the Risk of Mistransfusion in a Regional Transfusion Service,** Poster/Abstract presented at AABB Meeting, San Diego, October 2017.
Tammy Ison, Balkar Gill, Gwen Clarke, Carmela Pote, Melba Sarmiento. **Rare Donors Identified through Selective Genotype Testing using Voluntary Ethnic Donor Information,** CSTM abstract.
L. Ciurcovich, H. Abukhadra, T. Dolnik, B. Gill, I. Resz, M. Yan, G. Clarke. **Maintaining an Inventory of Rare Reagent Red Cells and Antisera Across Multiple Reference Laboratories at Canadian Blood Services,** Poster Presentation at CSTM (Canadian Society for Transfusion Medicine), Calgary, Alberta, May 30 – June 2, 2019.
Heba Abukhadra – Supervisor, BCY Diagnostic Services. **Transfusion Medicine Case Studies,** PBCO/CBS Education Session on Blood Transfusion Issues, October 3, 2019.
Kirsten Hannaford, Supervisor EDM Diagnostic Services. **Monocyte Monolayer Assay Implementation**, Presentation for Immunohematology Working Group, May 07, 2019.
Hannon JL, Berardi P, Hannaford K. **Significance of "Possible D" Variant on BioArray BeadChip™ RHD Genotyping of Prenatal Patients, Abstract for** AABB, San Antonio, TX, October 19 – 22, 2019.

Presentations / Abstracts / Publications Listing
K Hannaford, M Yan, L Ciurcovich, J Hannon, G Clarke. **RHD Genotyping of patients with serological weak D: 2444 Patient samples with no anti D on follow up of 428 with a variant RHD,** Abstract for AABB, San Antonio, TX, October 19 – 22, 2019.
Matthew Yan, Medical Officer, CBS BC & Yukon Centre. **Anti-M: A Case of Hemolytic Disease of the Fetus and an Approach to Prenatal Management**, Abstract, Presentation at CSTM, Calgary, Alberta May 30 – June 2, 2019.
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