DIAGNOSTIC SERVICES

British Columbia / Yukon

YEAR IN REVIEW

JANUARY – DECEMBER 2020

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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PERINATAL LABORATORY

The Perinatal Laboratory within Diagnostic Services at Canadian Blood Services provides diagnostic testing of pregnant women for blood type and red blood cell antibodies. Results from this screening assist physicians, midwives and nurse practitioners in ensuring the appropriate RhIG treatment recommendation and the management of pregnancy when antibodies to red cell antigens are present.

A. Testing Performed

Canadian Blood Services Perinatal Laboratory routinely performs the following tests:

- ABO/Rh blood type
- Screen for red blood cell antibodies
- Antibody Identification, if antibodies are detected
- Antibody Identification referrals
- Antibody Titration, if a clinically significant antibody is identified
- Phenotyping

B. Testing Frequency

Mothers – Initial Testing: All women should be tested upon their first prenatal visit.

Mothers – 26-28 Weeks Gestation: All Rh negative women should be retested at 26-28 weeks gestation. Rh positive women should also be retested at 26-28 weeks gestation when there is only one blood group result available (usually first pregnancy) or if patient is at increased risk of allo-immunization (e.g. previous transfusion, maternal trauma, obstetrical procedure, or fetal maternal hemorrhage).

Mothers – Antibody Present: If the antibody is known to cause HDFN, it is recommended that specimens be submitted every month followed by biweekly in the last trimester for the duration of the pregnancy dependant on the specificity of the antibody and the strength of the antibody titre.
For patients with titers of 16 or greater (and dependant on paternal phenotype) referral to Maternal Fetal Medicine clinic is recommended. Less frequent sampling may also be recommended for antibodies that are unlikely to be clinically significant or in cases where clinical monitoring through fetal Doppler ultrasound has commenced.

Refer to **Fetal Genotyping** (page 22) for additional information.

Mothers – Postnatal: Following delivery, specimens from the mother and her baby should be tested if the Rh of the mother is unknown, the mother is Rh negative, the mother has a clinically significant antibody or if the baby shows signs of HDFN (i.e. anemia or jaundice).

Partners: When a woman has an antibody capable of causing HDFN, specimens from the partner will be requested for ABO/Rh and antigen phenotyping. This will assist in assessing the probability of the baby being affected by the antibody. Partners' specimens may also be tested to assess Rh Immune Globulin (RhIG) eligibility of Rh negative mothers.

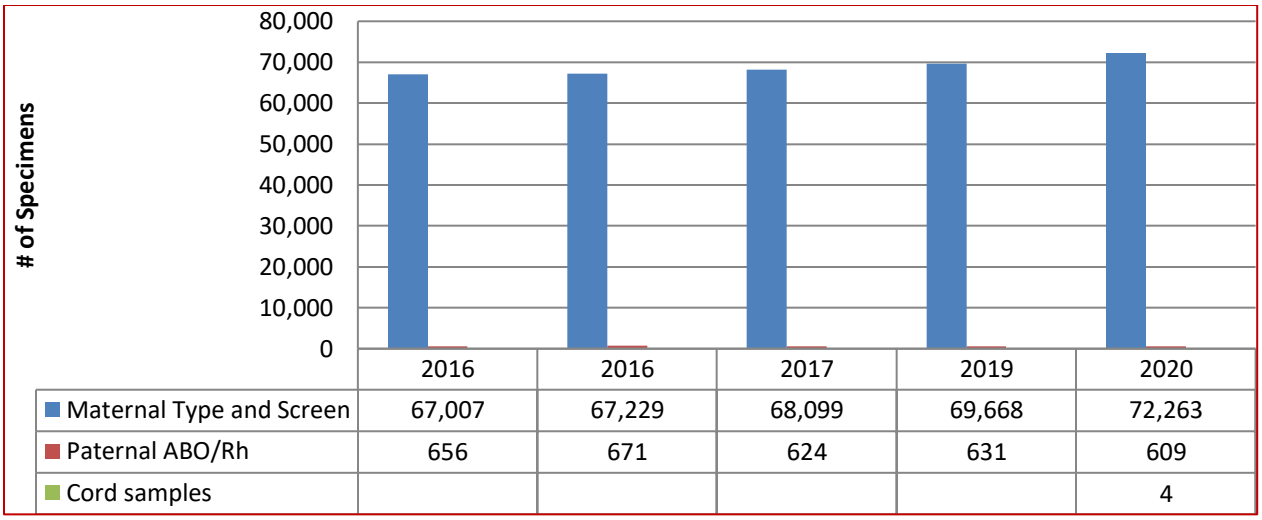
C. Specimens Tested

The data includes all women tested, including referrals.

Table 1: Perinatal Specimens Tested

Specimen Type	Test Type	2016	2016	2017	2019	2020
Maternal	Maternal-Type and Screen	67,007	67,229	68,099	69,668	72,263
Paternal	Paternal-ABO/Rh	656	671	624	631	609
Cord samples	ABO/Rh	Not reported	Not reported	Not reported	Not reported	4
Total # of Specimens Tested		**67,663**	67,899	68,723	70,299	72,876
Total # of Patients Tested		**57,089**	**62,063**	**64,992**	**69,624**	**60,677**

Figure 1: Total Perinatal Specimens Tested



D. Antibodies Identified

In 2020, a total of 457 antibodies were reported (see *Table 2*). This is more than 2019. Three hundred and eighty-one women (381) had antibodies identified during their pregnancies (increased from 379 women in 2019), of these; 259 women had clinically significant antibodies, 122 had clinically insignificant antibodies and 59 women had multiple antibodies. Passive anti-D data has been excluded from the preceding numbers. Antibodies identified were considered to be clinically significant if they have been reported to cause HDFN. The most common clinically significant antibodies identified were: anti-D, anti-E, anti-c, anti-K, (see *Figure 2*) which together represented 45% of the total antibodies identified. IgG Anti-M can also be considered clinically significant as it may cause HDFN and/or delayed anemia in rare cases.

Titres for 6 of the clinically significant antibodies increased from non-critical to critical levels during the pregnancy with a total of 24 antibody titres at critical levels (see *Table 3*). Recommendations were made for all patients with a critical titre level (current or previous pregnancy) and all Kell system antibodies to be referred to a High Risk Fetal Assessment Clinic for further follow-up and monitoring during pregnancy.

Table 2: Total Number of Perinatal Antibodies Detected

Maternal Antibodies Identified					
Clinically Significant Antibodies	**2016**	**2017**	**2018**	**2019**	**2020**
Anti-D	38	52	48	39	54
Anti-C	5	7	26	11	11
Anti-C^{w}	2	1	0	2	3
Anti-Ce	0	0	0	0	0
Anti-c	11	30	65	26	27
Anti-E	80	101	150	80	72
Anti-e	3	2	4	6	4
Anti-G	2	4	6	7	7
Anti-K	33	41	70	55	38
Anti-Kp^{a}	0	1	2	0	0
Anti-Lu^{b}	1	0	2	0	0
Anti-M*	47	49	52	37	38
Anti-S	6	8	13	11	10
Anti-s	2	1	0	0	0
Anti-U	0	0	2	0	0
Anti-Fya	1	8	12	7	4
Anti-Fyb	1	1	3	1	2
Anti-Jka	15	23	28	17	16
Anti-Jkb	1	8	4	8	6
Anti-Jk3	1	0	0	2	1
Anti-Vw	0	0	0	0	0
Anti-Wra	3	3	4	4	2
Anti-Jra	0	0	0	0	0
Anti-Inb	0	0	0	0	0
Anti-Sc1	0	0	0	0	1
Anti-Lua	0	1	2	0	1
Anti-Cob	0	0	0	1	0
Anti-Dantu	0	0	0	1	2
Anti-Joa	0	0	1	0	0
Anti-Mur	0	0	1	0	1
Anti-PP1Pk	0	0	1	0	0
Anti-Yta	0	1	2	0	0
Anti-Lu14	0	0	0	0	2
Anti-Dia	0	0	0	0	2
Anti-Mit	0	0	0	0	1
Total	**252**	**342**	**498**	**315**	**305**

*Anti-M – IgG antibody component detected

Clinically Insignificant Antibodies	2016	2017	2018	2019	2020
Anti-A1	12	11	9	9	15
Anti-Lea	7	11	20	7	11
Anti-Leb	1	5	3	5	4
Anti-N	1		1	0	2
Anti-P1	20	19	2	6	6
Anti-Sda			0	0	0
Antibody to an HLA related antigen	Not reported	Not reported	Not reported	Not reported	5
Cold Agglutinin	Not reported	Not reported	Not reported	Not reported	11
Warm autoantibody	Not reported	Not reported	Not reported	Not reported	44
Unidentified antibody	Not reported	Not reported	Not reported	Not reported	54
Passive Anti-D *(not included in totals)*	681	726	588	687	719
TOTAL: Clinically Insignificant Antibodies	**41**	**46**	**35**	**27**	**152**

Table 3: Perinatal Patient Antibody Titres 2020

Antibody	Critical Level	Non-Critical Level	Non-Critical to Critical
Anti-C		5	
Anti-c	1	19	
Anti-Ce		5	
Anti-cE		1	
Anti-CG		1	
Anti-Cw		3	
Anti-D	4	52	2
Anti-DC	2		
Anti-DG		3	
Anti-DG	1		
Anti-Dia		2	
Anti-E	8	82	4
Anti-e		3	
Anti-Ec	2	6	1
Anti-Fya		4	
Anti-Fyb		2	
Anti-G	1	2	1
Anti-Jk3		2	
Anti-Jka	1	21	1

Antibody	Critical Level	Non-Critical Level	Non-Critical to Critical
Anti-Jkb	1	10	1
Anti-Lu14		4	
Anti-Lua		2	
Anti-M	1*	41	
Anti-Mit		1	
Anti-Mur	1		
Anti-S	1	11	
Anti-s			
Anti-Wra	1	1	

*Anti-IgG titre

Figure 2: Total Number of Perinatal Antibodies 2020

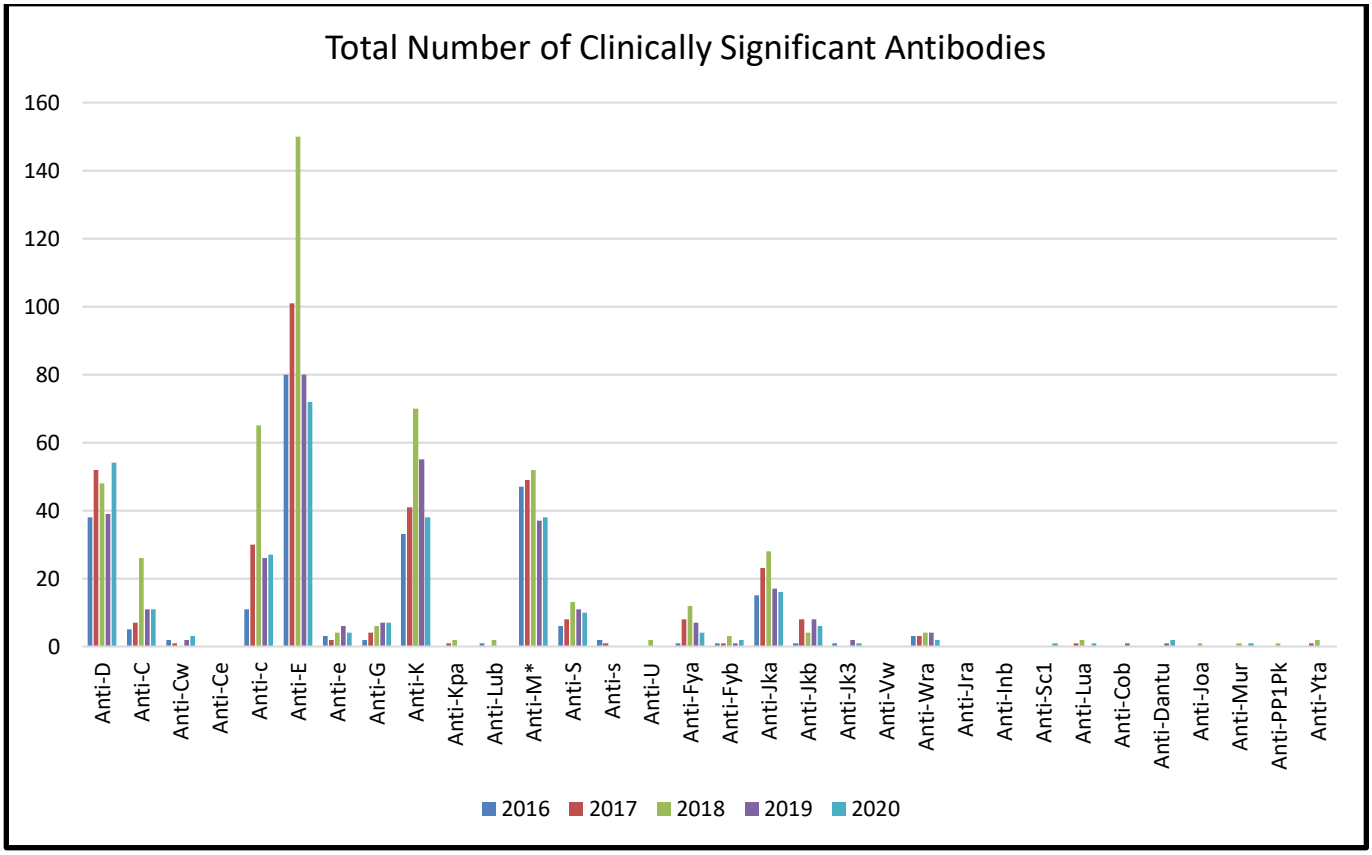


Figure 3: Frequency of Clinically Significant Antibodies 2020

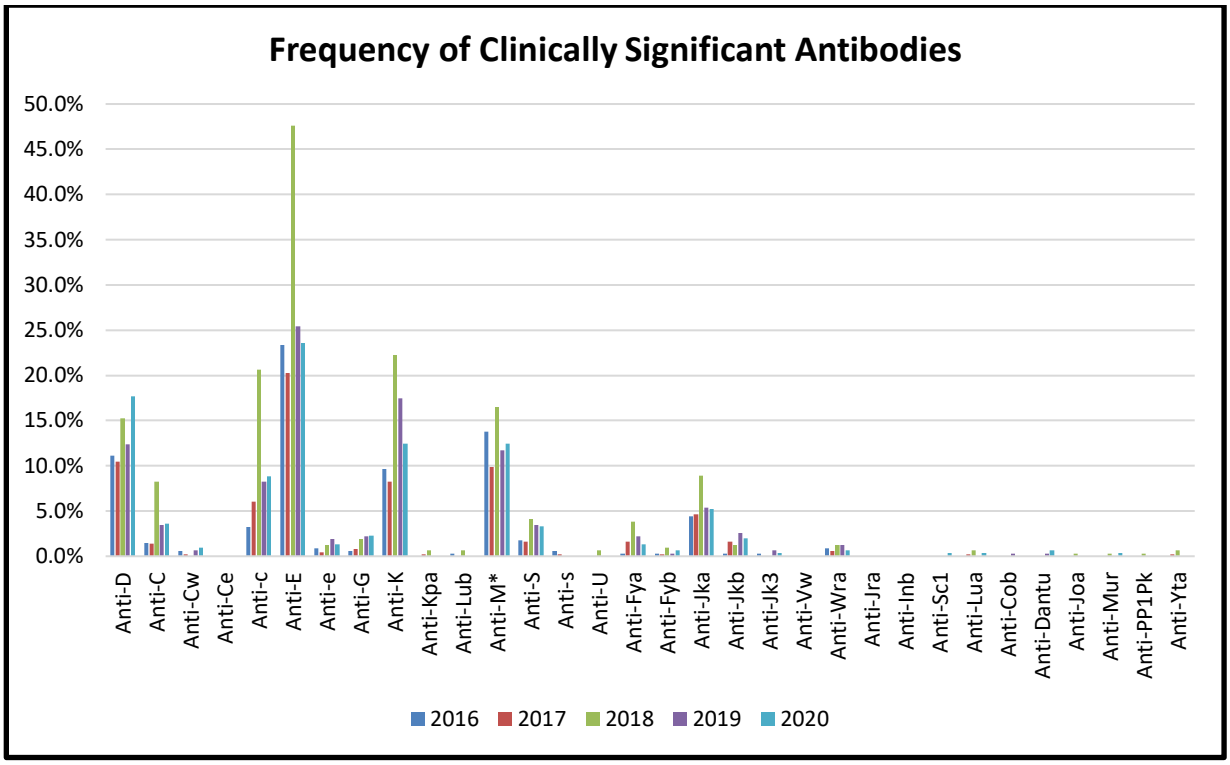


Table 4: Combination Prenatal Antibodies 2020

Combination Antibodies	Prenatal
Anti-C Anti-e	1
Anti-C Anti-e Unidentified Antibody	1
Anti-C Anti-G	4
Anti-c Anti-Jka	1
Anti-c Anti-Jka Warm Autoantibody	1
Anti-c Anti-S	1
Anti-C Unidentified Antibody	1
Anti-D Anti-C	4
Anti-D Anti-C Anti-G	1
Anti-D Anti-C Anti-G Unidentified Antibody	1
Anti-D Anti-G	1
Anti-D Anti-G Anti-Dia Unidentified Antibody	1
Anti-D Anti-G Unidentified Antibody	1
Anti-D Anti-M	1
Anti-D Unidentified Antibody	1
Anti-Dantu Warm Autoantibody	1
Anti-E Anti-A1	1
Anti-E Anti-c	7
Anti-E Anti-c Anti-Jka	1

Anti-E Anti-Fya	1
Anti-E Anti-Lu14	1
Anti-E Anti-Wra	1
Anti-E Warm Autoantibody	1
Anti-Fyb Anti-Jka Warm Autoantibody Unidentified Antibody	1
Anti-K Anti-Jkb	1
Anti-K Anti-M	1
Anti-Lea Anti-Leb	2
Anti-Lea Unidentified Antibody	1
Anti-Leb Unidentified Antibody	1
Anti-M Unidentified Antibody	5
Anti-Mit Anti-Wra Unidentified Antibody	1
Anti-N Cold Agglutinin	1
Anti-S Anti-Fyb	1
Anti-S Anti-Jkb	1
Anti-S Anti-Jkb Unidentified Antibody	1
Anti-S Unidentified Antibody	1
Anti-S Warm Autoantibody	1
Warm Autoantibody Unidentified Antibody	2

REFERENCE LABORATORY

The Reference Laboratory, Vancouver Diagnostic Services provides testing for hospital transfusion medicine 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 (24 hours, 7 days per week). 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).

Diagnostic Services Red Cell Antibody Investigations

In 2020, hospitals have referred 428 requests for red cell antibody identification.

Diagnostic Services provides support for all BC and Yukon hospitals. 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 the investigation. When a new antibody is identified by the Diagnostic Services Laboratory, a patient wallet card may be provided.

A. The Testing Performed to support patient referral investigations includes:

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

- Phenotyping (patient and donor units)
- Transfusion Reaction Investigation
- Direct Antiglobulin Test
- Elution
- Allo and Auto Adsorptions
- Neutralization Tests
- Referral Genotype Testing

Antibody Screening is routinely performed by solid phase testing. A combination of solid phase testing and indirect antiglobulin tube testing using PEG for enhancement are the primary antibody identification methods. Gel IAT testing may also be used.

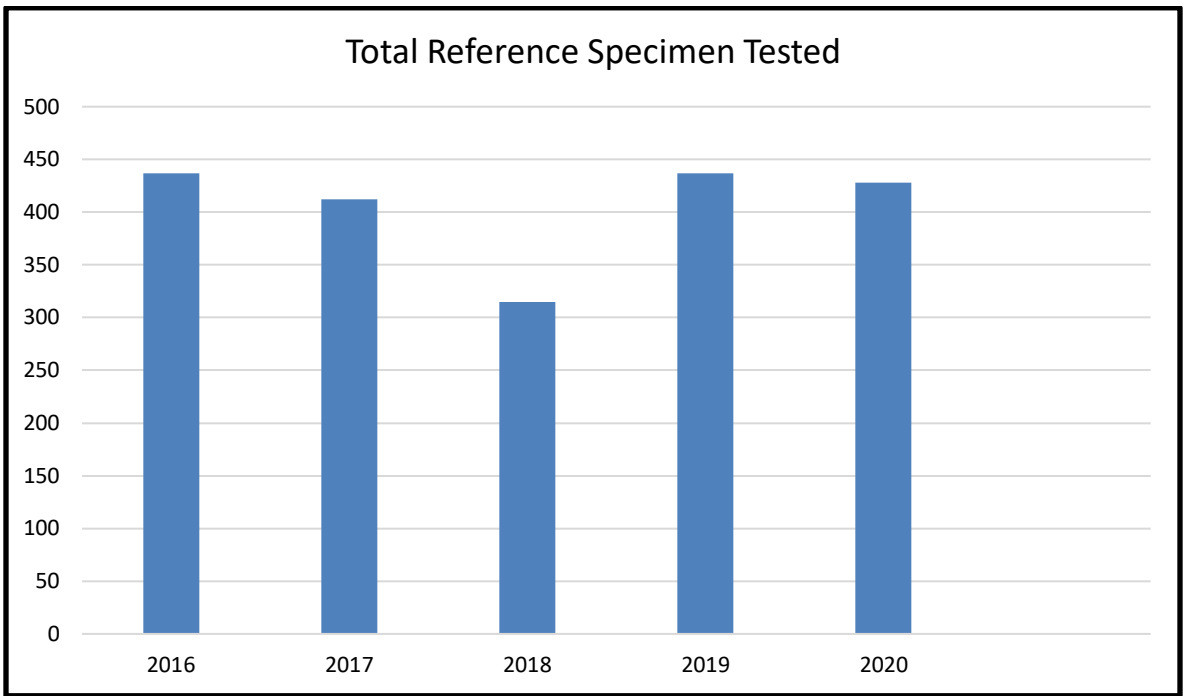
B. Specimens Tested

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

Table 5: Reference Specimens Tested

Specimen Type	2016	2017	2018	2019	2020
Total Reference Antibody Investigations	437	412	315	437	428

Figure 4: Total Reference Specimens Tested



C. Antibodies Identified

In 2020, a total of 436 antibodies were reported (see *Table 6*). The total number of antibodies detected is higher than in 2019, but the distribution of the most common antibodies remains consistent. Two hundred and fifty-three (253) patients had antibodies identified; of these, one hundred and seven (107) patients had multiple antibodies. Antibodies identified were considered to be clinically significant if they have been reported to cause acute or delayed hemolytic transfusion reactions. The most common clinically significant antibodies identified were: anti-D, anti-E, anti-K, anti-c, anti-Fya (see *Figure 5*) which together represented 59% of the total antibodies identified.

Investigation of warm autoantibodies is a frequent request. Techniques including such as auto and alloadsorption may be used along with DTT treatment of screening or panel cells for anti CD38-related panreactivity.

Table 6: Total Number of Reference Antibodies Detected

Reference Antibodies Identified					
Antibodies Detected	**2016**	**2017**	**2018**	**2019**	**2020**
Anti-D	38	52	15	50	11
Anti-A1	12	11	9	2	
Anti-C	5	7	21	10	19
Anti-c	11	30	20	13	12
Anti-Ce					
Anti-Ch					1
Anti-Cob					1
Anti-C^w	2	1	3	2	7
Anti-Dantu				1	
Anti-Dia					1
Anti-E	80	101	40	42	40
Anti-e	3	2	6	7	2
Anti-f				1	
Anti-Fya	1	8	15	12	8
Anti-Fyb	1	1	2	3	3
Anti-Fy3					1
Anti-G	2	4	11	7	7
Anti-Ina					
Anti-Inb					
Anti-Jk3	1		3	1	1
Anti-Jka	15	23	10	10	14
Anti-Jkb	1	8	6	3	2
Anti-JMH					1
Anti-Jra					1
Anti-K	33	41	26	23	26
Anti-k			1		1
Anti-Kp^a		1	1	1	5
Anti-Kpb			1		
Anti-Lea	7	11	20	2	3
Anti-Leb	1	5	3	1	2
Anti-Lua		1		2	1
Anti-Lub				2	
Anti-Lu14	1				1

Reference Antibodies Identified					
Antibodies Detected	**2016**	**2017**	**2018**	**2019**	**2020**
Anti-LW					1
Anti-M	47	49	10	6	11
Anti-McCd/ Anti-Vil				1	2
Anti-Mia			2		
Anti-Mur			1		
Anti-N	1		1	1	1
Anti-P1	20	19	2	2	5
Anti-S	6	8	9	6	8
Anti-s	2	1			
Anti-Sc1					
Anti-Sda			0	2	
Anti-U					1
Anti-V		1			
Anti-Vel					1
Anti-Vw			1		
Anti-Wra	3	3	2	3	4
Anti-Yta		1			
Antibody to a Low Prevalence Antigen					1
Antibody to an HLA related antigen					1
Autoantibody					1
Warm autoantibody					131
Cold Agglutinin					33
Unidentified antibody					37
Passive Anti-D	15	19	19	22	27
TOTAL:	**308**	**408**	**260**	**238**	**436**

Figure 5: Total Number of Reference Antibodies

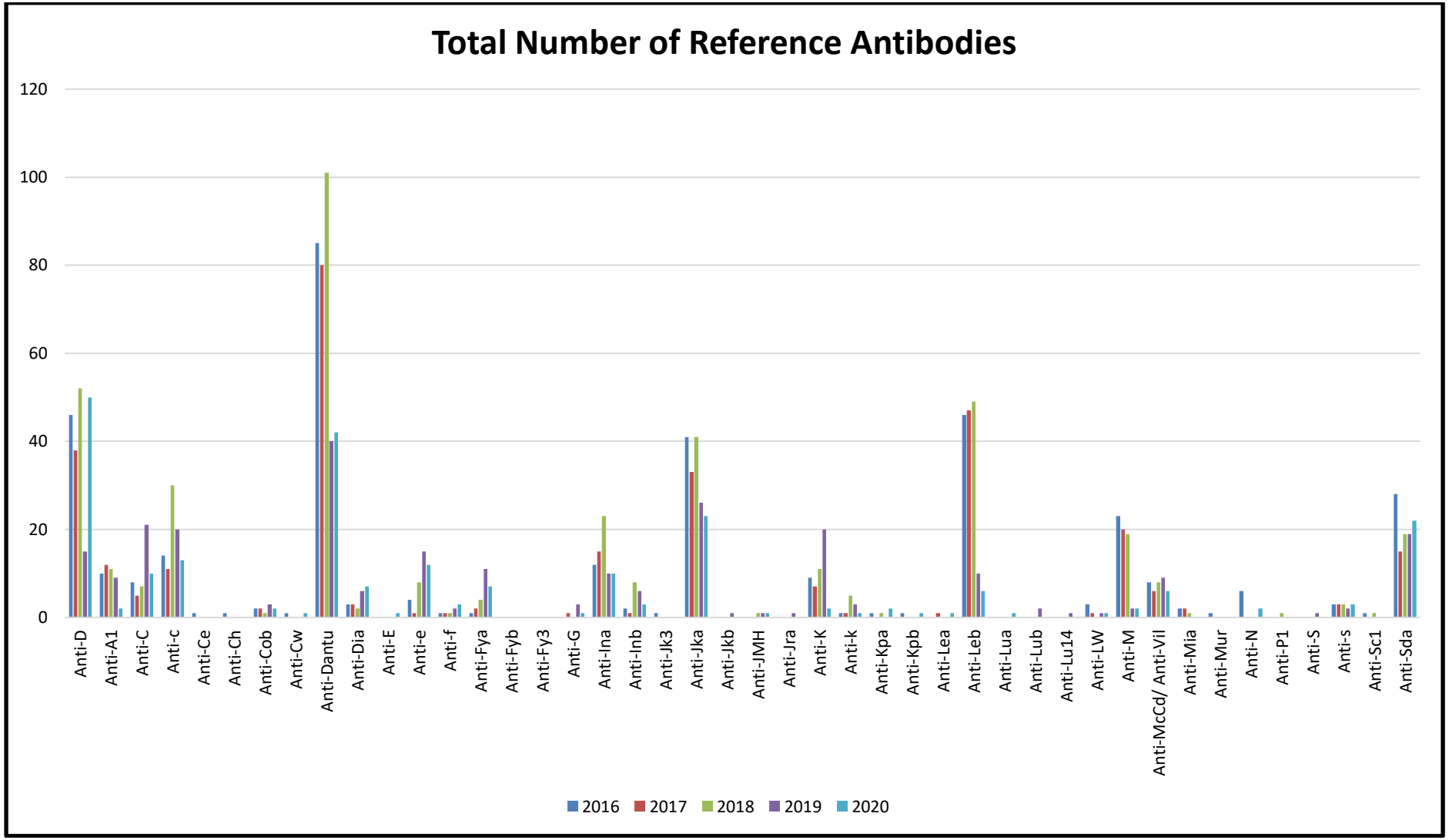


Figure 6: Frequency of Reference Antibodies

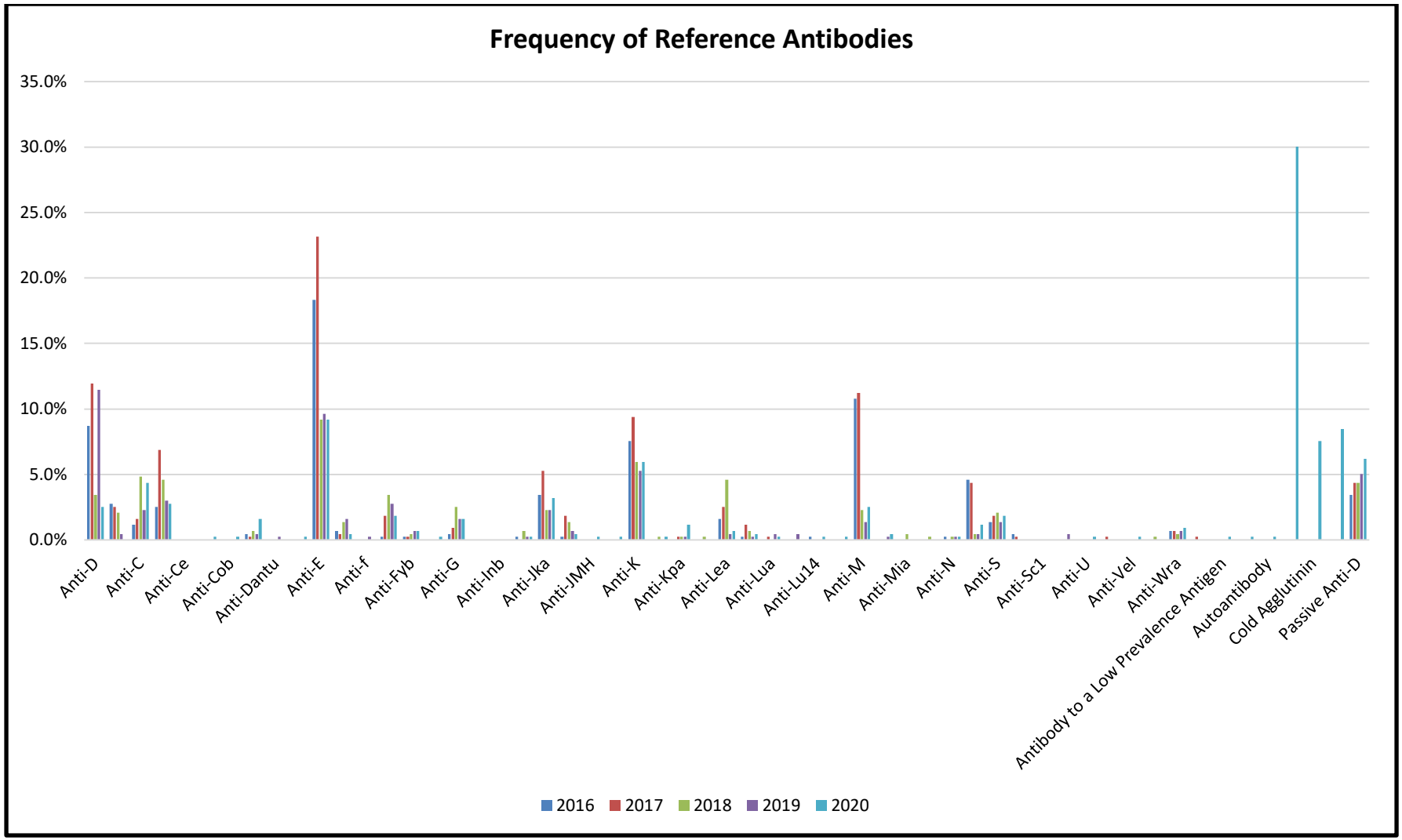


Table 7: Combination Reference Antibodies 2020

Combination Antibodies	Serology
Anti-c Anti-Cw Anti-Fya	1
Anti-c Anti-Cw Anti-M Anti-Jka	1
Anti-C Anti-E Anti-S Warm Autoantibody	1
Anti-C Anti-Fya Antibody to an HLA related antigen Unidentified Antibody	1
Anti-C Anti-G	1
Anti-C Anti-G Anti-Fya	1
Anti-C Anti-Jka	1
Anti-c Anti-Jka Warm Autoantibody	1
Anti-c Anti-K Anti-Fya	1
Anti-c Anti-K Warm Autoantibody	1
Anti-c Anti-S	1
Anti-c Anti-S Warm Autoantibody	1
Anti-C Unidentified Antibody	1
Anti-C Warm Autoantibody	1
Anti-Cw Anti-Fya Unidentified Antibody	1
Anti-Cw Anti-K Anti-Kpa Anti-Jkb	1
Anti-Cw Unidentified Antibody	1
Anti-Cw Warm Autoantibody Cold Agglutinin	1
Anti-D Anti-C	2
Anti-D Anti-C Antibody to a Low Prevalence Antigen Unidentified Antibody	1
Anti-D Anti-C Anti-E	2
Anti-D Anti-C Anti-k	1
Anti-D Anti-C Unidentified Antibody	1
Anti-D Anti-C Warm Autoantibody	1
Anti-D Anti-Fya	1
Anti-D Anti-G	1
Anti-E Anti-c	1
Anti-E Anti-c Anti-Cob	1
Anti-E Anti-c Anti-Jka Warm Autoantibody	1
Anti-E Anti-c Warm Autoantibody	1
Anti-E Anti-Cw Anti-Jka	1
Anti-E Anti-Jka	1
Anti-E Anti-Jka Warm Autoantibody Unidentified Antibody	1
Anti-E Anti-K	1
Anti-E Anti-K Warm Autoantibody	2

Combination Antibodies	Serology
Anti-E Anti-K Warm Autoantibody Cold Agglutinin	1
Anti-E Anti-Kpa Warm Autoantibody	1
Anti-E Anti-M Anti-K Anti-Fyb	1
Anti-E Anti-M Anti-P1	1
Anti-E Unidentified Antibody	3
Anti-e Unidentified Antibody	1
Anti-E Warm Autoantibody	10
Anti-E Warm Autoantibody Cold Agglutinin	2
Anti-E Warm Autoantibody Unidentified Antibody	1
Anti-Fy3 Warm Autoantibody Unidentified Antibody	1
Anti-Fyb Warm Autoantibody	2
Anti-Jka Unidentified Antibody	1
Anti-Jka Warm Autoantibody	2
Anti-K Anti-Fya Anti-Jka Warm Autoantibody	1
Anti-K Anti-Fya Warm Autoantibody	1
Anti-K Anti-Jkb	1
Anti-K Anti-M Anti-Jka Warm Autoantibody	1
Anti-K Anti-McCd/ Anti-Vil	1
Anti-K Anti-P1	1
Anti-K Warm Autoantibody	5
Anti-K Warm Autoantibody Cold Agglutinin	2
Anti-Kpa Anti-LW Warm Autoantibody	1
Anti-Kpa Unidentified Antibody	2
Anti-Lea Anti-Leb Warm Autoantibody	1
Anti-Lu14 Anti-Dia Anti-Wra Warm Autoantibody	1
Anti-S Warm Autoantibody	3
Anti-S Warm Autoantibody Unidentified Antibody	2
Anti-U Anti-Lea Anti-Leb	1
Anti-Wra Warm Autoantibody	1
Autoantibody Cold Agglutinin	1
Warm Autoantibody Cold Agglutinin	11
Warm Autoantibody Cold Agglutinin Unidentified Antibody	1
Warm Autoantibody Unidentified Antibody	1

FETAL GENOTYPING

Canadian Blood Services in BC refers specimens for fetal blood group genotyping from maternal plasma to the International Blood Group Reference Laboratory (IBGRL) of the National Health Services (NHS) in Bristol, United Kingdom.

Specimens are submitted through the Maternal Fetal Medicine clinics in BC and are accepted if they meet the following criteria:

- The mother has an antibody capable of causing hemolytic disease of the fetus/newborn (HDFN), AND
- The father is heterozygous for the corresponding antigen (or unknown), AND
- The antibody titre has reached a critical level, OR
- There has been a previous fetus/newborn affected by HDFN, and
- The antibody is RH and/or anti-K

Discussion with a Canadian Blood Services physician is required prior to submitting specimens for testing outside of these criteria.

Table 8a: Fetal Genotyping Results Summary 2020

Patient	Maternal Antibody	Predicted Fetal Phenotype	Follow-up Required
1	Anti-E Anti-c	E+c+	YES
2	Anti-D	D+	YES
3	Anti-K Anti-Jkb	Results indeterminate	YES
4	Anti-K	K+	YES
5	Anti-K	Results indeterminate	YES
6	Anti-K	K-	NO
7	Anti-D	D+	YES
8	Anti-E	E+	YES
9	Anti-D, anti-C	D+	YES
10	Anti-E, Anti-c	E-c-	NO
11	Anti-E	E+	YES
12	Anti-K	K-	NO
13	Anti-E	E+	YES
14	Anti-E	E+	YES

Table 8b: Fetal Genotyping Results Totals 2020

	2020
Total samples sent	19
# of patients tested	**14**
# of patients not requiring MFM follow-up. (Fetus tested negative for the corresponding antigen)	**3**

RHD RED CELL GENOTYPING

Based on the following testing algorithm patients with a serologically variable Rh D typing results may have a genetic testing for the RHD gene. For 2020, the following results were obtained in patients using one of the two Red Cell antigen genotyping platforms available at CBS:

Figure 7: Rh D Testing Algorithm

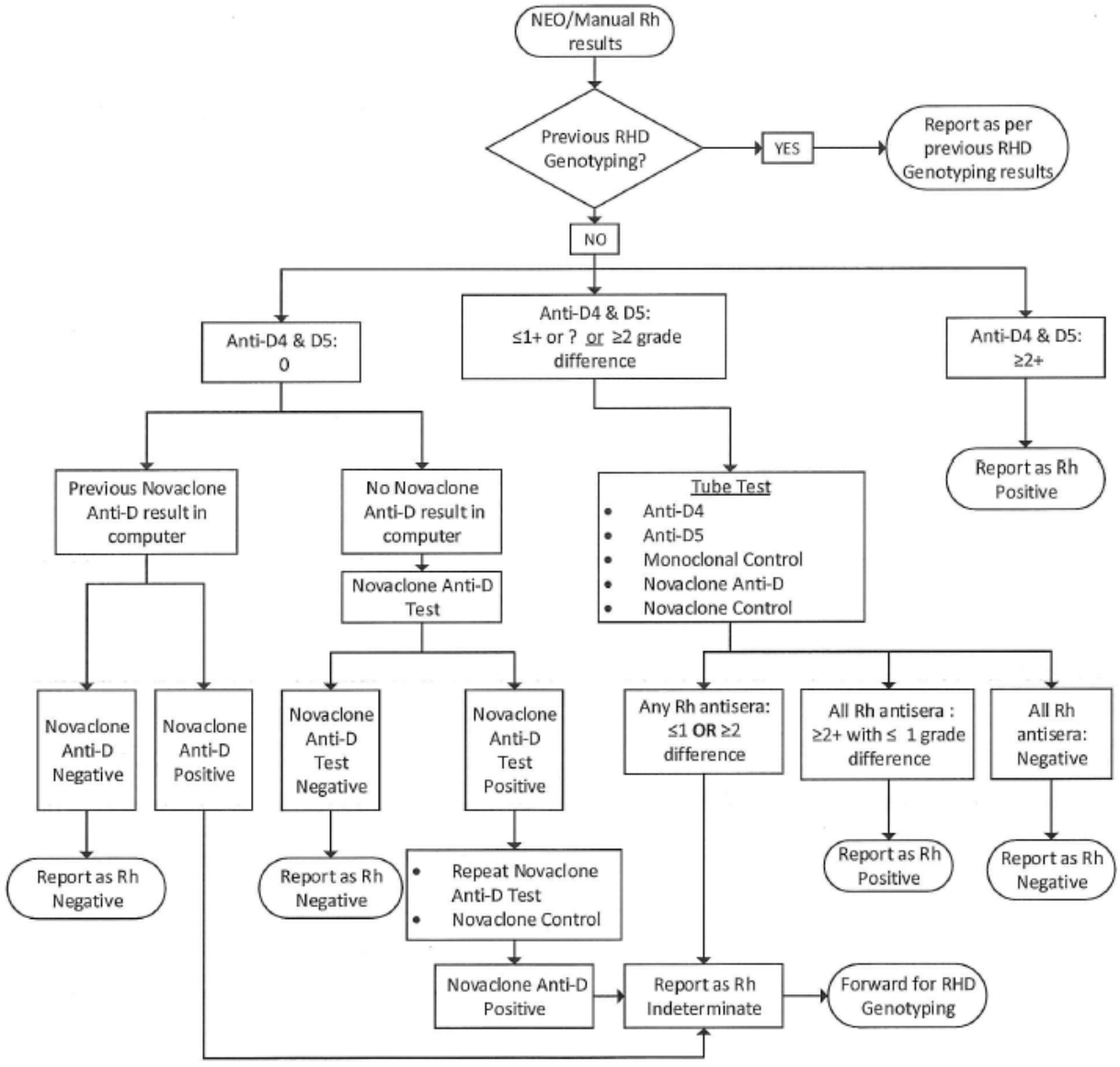


Table 9: Patient # - RHD Type/Result 2020

# of Patients	RHD Genotype	Predicted Phenotype	RHD Sequencing	Rh(D) Group
6	DAR	D variant	NO	NEG
1	DAU2	D Variant	NO	NEG
2	DAU4 or DV type 5	D Variant	NO	NEG
1	DHMi	D Variant	NO	NEG
1	DIIIa and Possible D	D Positive	NO	POS
1	DVI	D Variant	NO	NEG
38	Possible D	D Positive	NO	POS
1	RHD Deletion	RHD Deletion	NO	NEG
31	Weak D type 1	Weak D	NO	POS
18	Weak D type 2	Weak D	NO	POS
26	Weak D type 3	Weak D	NO	POS
16	Weak D type 4.0 or 4.3	Weak D	NO	NEG
1	Weak D type 4.0 or 4.3/DIIIa-CE(4-7)-D	Weak D	NO	NEG
1	Weak D type 41.0.1	Weak D	YES	NEG
144	**Total number tested**			

The array used for RHD genotyping (Immucor's BioArray BeadChip™ Molecular Assay) is extensive and can detect the most common mutations of the RHD gene. The most common variants detected are weak D type 1, weak D type 2 and weak D type 3. Individuals with these phenotypes can be safely treated as Rh positive as it has been established that they will not form alloanti-D. Patients with any other weak or partial D phenotypes may be capable of forming alloanti-D and should be treated as Rh negative. When none of the variants present on the array are detected, the software will produce a result of "Possible D". Prior to 2018, it was decided to err on the side of caution, and Canadian Blood Services recommended that patients with a result of "Possible D" be treated as Rh negative. However, based on clinical experience and sequencing studies, it has been confirmed that the vast majority of these patients do not have a mutation of the RHD gene. In 2018 the reporting was changed to reflect this and patients with results of "Possible D" were reported as Rh positive individuals.

Table 10: RHD Genotyping – Number of Rh Negative and Rh Positive Predicted Phenotypes

	2019	2020
Rh Positive	106	114
Rh Negative	24	30
Total # samples tested	130	144

Note: Data not captured prior to 2019

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.

A. 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 Vancouver 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. Samples whose testing exceeds the expected TAT are usually those where clinically significant antibodies are detected or where difficulty in finding compatible blood is encountered.

Table 11: Turnaround Time – Routine Criteria by Specimen Type

Specimen Type	Expected Turnaround Time	Expected % of Specimens Which Meet or Exceed Expected TAT
Routine Perinatal	< 72 hours	85%
Reference Testing	<72 hours	85%

Table 12: Turnaround Time – Routine Perinatal Specimens

Turnaround Time (TAT)	2016	2017	2018	2019	2020
% of Specimens Tested within 72 hours	91%	88%	91%	88%	89%
% of Specimens Tested > 72 hours	9%	12%	9%	12%	11%

Figure 8: Perinatal Routine TAT

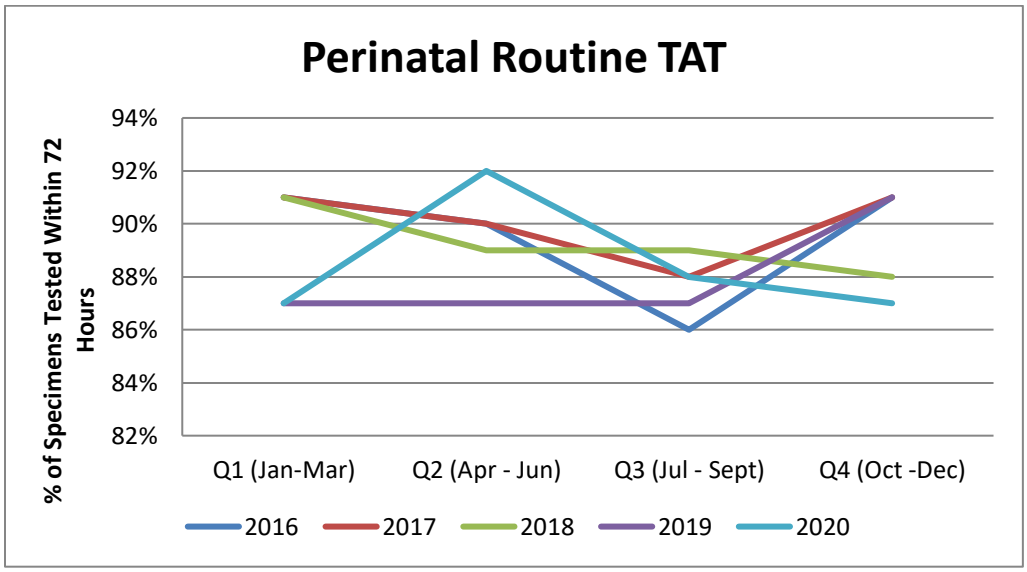
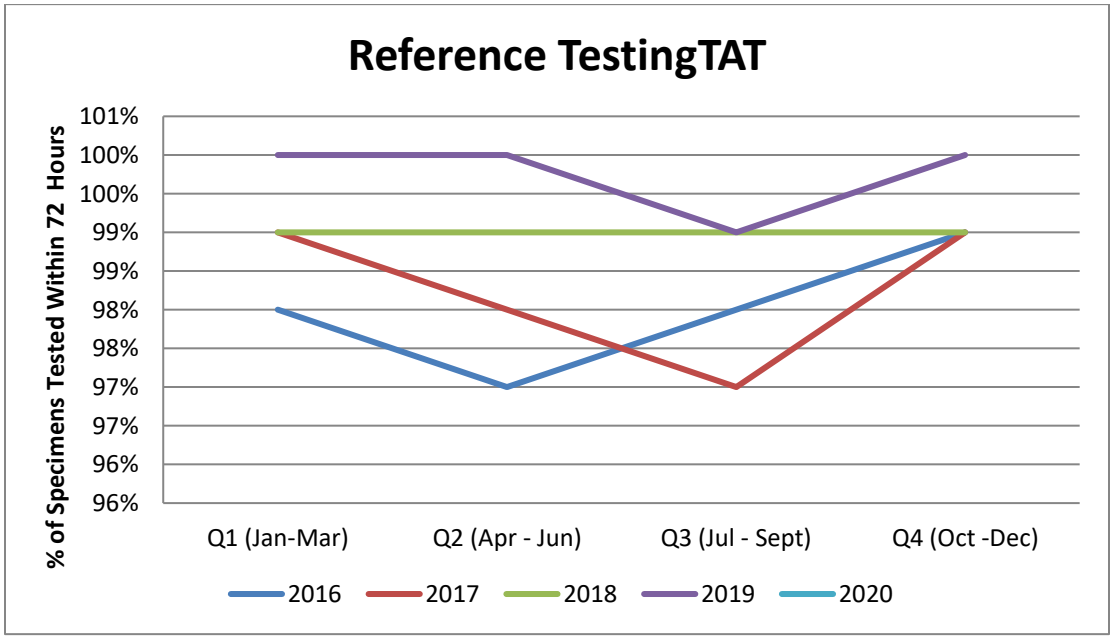


Table 13: Reference TAT

Turn Around Time (TAT)	2016	2017	2018	2019	2020
% of Specimens Tested within 72 hours	98%	98%	99%	100%	100%
% of Specimens Tested > 72 hours	2%	2%	1%	0%	0%

Figure 9: Reference TAT



B. Rejected Specimens

Each time a specimen is rejected, a reason for rejection is entered into our Laboratory Information System. This data is then retrieved and analyzed on a quarterly basis. The number of rejected specimens is quite low for both perinatal and reference specimens. Reference specimens come from hospitals and perinatal samples are primarily collected at external collection sites.

For perinatal specimens, the most common reason for rejecting a sample is that the sample is a duplicate. Samples are rejected if another sample from the patient was tested within the previous week. Often a duplicate sample is collected when the patient has seen their family physician and then sees their obstetrician shortly after. We do ensure that the report from the initial testing is sent to the second physician making the request. Health care professionals can access Canadian Blood Services reports for BC patients on Care Connect (BC's Electronic Health Record).

Table 14: Quarterly Rejection Rates – Perinatal Specimens 2020

Rejection Category	Q1	Q2	Q3	Q4
Requisition	18	2	6	1
Specimen	36	86	81	57
Discrepancies Between Requisition & Specimen	1	1	0	1
Discrepancies Between Current Requisition & Historical Records	0	0	0	0
Other (Duplicates, etc.)	83	4	6	8
Total # specimens rejected	138	93	93	67
Total # specimens received	19679	15502	17120	18814
Rejections as a % of total	**0.7%**	**0.6%**	**0.5%**	**0.4%**

Figure 10: Perinatal Rejection Reasons 2020

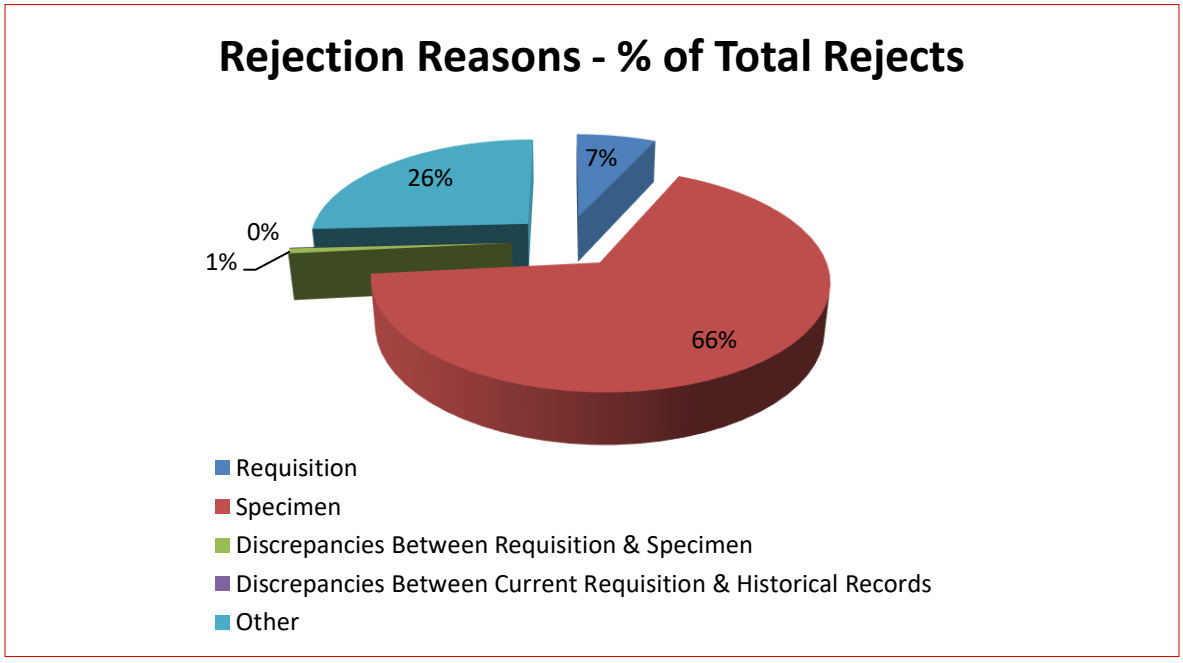
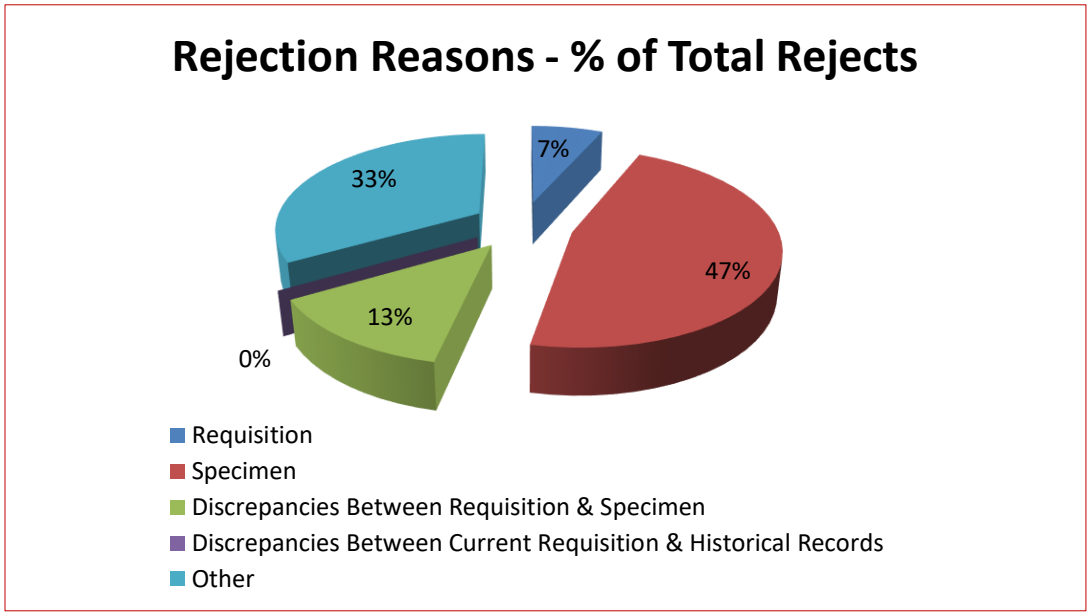


Table 15: Quarterly Rejection Rates – Reference Specimens 2020

Rejection Category	Q1	Q2	Q3	Q4
Requisition	0	1	0	0
Specimen	6	1	0	0
Discrepancies Between Requisition & Specimen	0	2	0	0
Discrepancies Between Current Requisition & Historical Records	0	0	0	0
Other (Duplicates, etc.)	0	5	0	0
Total # specimens rejected	6	9	0	0
Total # specimens received	129	95	125	136
Rejections as a % of total	4.7%	9.5%	0.0%	0.0%

Figure 11: Reference Rejection Reasons 2020



DIAGNOSTIC SERVICES UPDATE 2020

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

Vancouver	**Implementation of Electronically Fillable forms onto www.blood.ca** Perinatal Screen Request MM 1000107776 (2020-05-04) converted to electronic fillable form and posted on www.blood.ca. 2020-06-01 Diagnostic Services Antibody Investigation Request Form F801802 (2020-06-15)
Edmonton	**Implementation of the New CBS PN Requisition- 2020-01-07** A new CBS PN requisition was implemented in Edmonton on 2020-01-07 (F801780)
	Implementation of Electronically Fillable forms onto www.blood.ca Request for Perinatal Testing for Red Blood Cell Serology F801780 converted to electronic fillable form and posted on www.blood.ca. 2020-06-01. Request for RHD Genotyping (EN & FR) F801723, Request for Patient Blood Group Genotyping (EDM) F801221 and Request for Serological Investigation (EDM) F801897converted to electronic fillable form and posted on www.blood.ca. 2020-09-01
	CSPSA Accreditation Renewed- 2020

Winnipeg	**Preparation of Red Cell Aliquots for Neonatal and Pediatric Transfusion** The process to implement the preparation of small volume red cell aliquots- requested as either patient dose-specific (volume specific and irradiated) or as stock (standard size and non-irradiated) was implemented on 2020-01-27.
	Implementation of Electronically Fillable forms onto www.blood.ca Request for Perinatal Testing 1000107827 (Rh101) effective 2020-06-18 Request for Pre-Transfusion Testing 1000107837 (XM101A) effective 2021-01-11 Request for Blood Components 1000107830 (XM101) effective 2021-01-11 Request for Miscellaneous Testing 1000107834 (XM104) effective 2021-01-11 Transfusion Reaction Investigation 1000107838 (CM105) effective 2021-01-11 Platelet Immunology Laboratory Requisition 1000104677 effective 2021-01-11 TRALI Patient Data form 1000104723 effective 2021-01-11
	Discontinuation of 40 Week RhIG treatments Medical collaboration with Obstetrics department to review the value of RhIG treatment at 40 weeks in light of practice to treat at delivery resulted in a joint decision to discontinue the long-standing practice to treat at 40 weeks. Although the discussions and decisions were made in 2020, the change was effective 2021-01-15
	Incorporation of clinical interpretive comments on PI reports for FNAIT testing As a customer satisfaction initiative, standardized comments were developed that would be included for the common results' scenarios found when Maternal, Paternal, and sometimes Neonatal samples are submitted for Fetal/Neonatal Allo-Immunization Testing (FNAIT). Implemented on 2020-07-27.

Presentations / Abstracts / Publications Listing
M Farrell,[1] G Clarke,[1,2] G Barr, [2] J Hannon[1,2] **Monitoring of Prenatal Patients Using a Combined Antibody Titre for Rh and non-Rh Antibodies** Transfusion Medicine, Volume 30 Issue 3 January 19, 2020
Antoine Lewin, Shadhiya al Khan, Lynnette Beaudin, Lynne Meilleur, Gwen Clarke, Lucie Richard. **Report on the 19th International Society of Blood Transfusion Platelet Immunology Workshop 2018** Vox Sanguinis/ Volume 115, Issue 8/ p. 767-782, 28 May 2020
Lhevinne Ciurcovich/Heba Abukhadra **Back to Typing School – A Primer on Resolving Blood Grouping Anomalies",** Presentation for CBS/ PBCO Education Day, 01 Oct 2020