DIAGNOSTIC SERVICES

MANITOBA

YEAR IN REVIEW

JANUARY – DECEMBER 2022

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 management of a pregnancy for both the mother and baby.

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
- Fetal Bleed Screening Test
- Kleihauer-Betke Test for Quantitation of fetal-maternal hemorrhage
- Direct Antiglobulin Test for detection of HDFN (Hemolytic Disease of the Fetus/Newborn)
- Bedside testing during fetal cordocentesis

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 suspected fetal hemorrhage).

Mothers – Antibody Present: If the antibody is known to cause HDFN, it is recommended that specimens be submitted every two to four weeks for the duration of the pregnancy dependant on the specificity of the antibody and the strength of the antibody titre. More frequent testing may be indicated if the antibody titre rises rapidly or if clinical monitoring mandates that additional sampling would provide helpful information. 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.

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). Midwives or hospitals that do not perform transfusion medicine testing should submit specimens to Canadian Blood Services. A fetal bleed screening test is performed if a Rh-negative woman delivers a Rh-positive baby. The Kleihauer-Betke assay is performed when the mother has a positive fetal bleed screening test.

Newborns (Cords): Cord blood or neonate specimens must be submitted with the mother's specimen as noted above. ABO/Rh testing is performed on cord or neonatal, when indicated, on specimens submitted to Canadian Blood Services. The direct antiglobulin test is performed if the mother has a clinically significant antibody or on request if the baby shows signs of HDFN (i.e. anemia or jaundice). This is especially important when the mother is Rh negative or when the mother has a clinically significant antibody. If the baby has unexpected anemia or jaundice, assessment of the cord blood sample for blood group and DAT may also be helpful.

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.

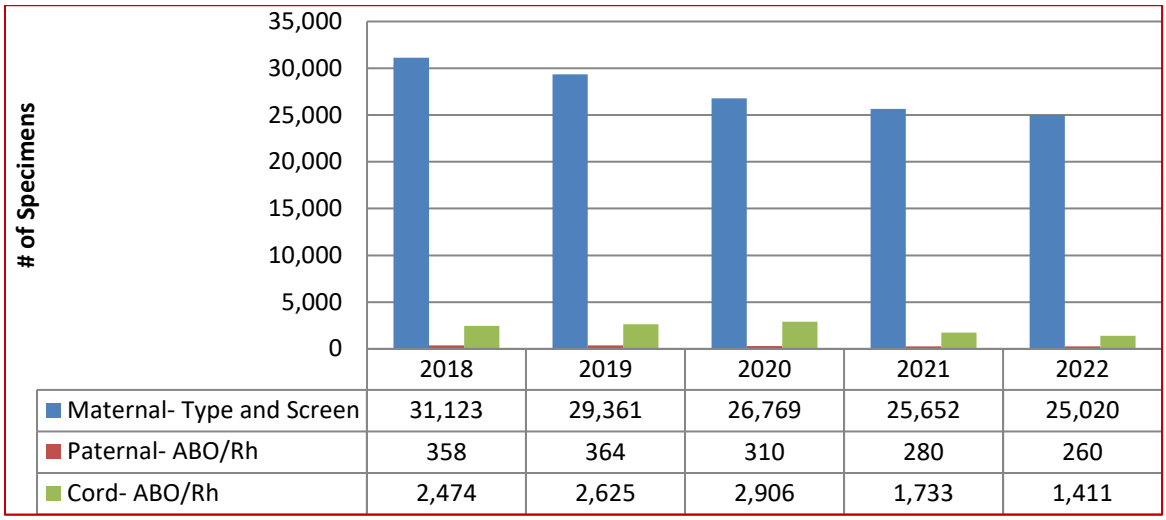
C. **Specimens Tested**

The data includes all women tested, including referral patients from other provincial jurisdictions. The total number of specimens tested shows a slight decrease when compared to the last 4 years as seen in *Table 1* below.

Table 1: Perinatal Specimens Tested

Specimen Type	Test Type	2018	2019	2020	2021	2022
Maternal	Maternal- Type and Screen	31,123	29,361	26,769	25,652	25,020
Paternal	Paternal- ABO/Rh	358	364	310	280	260
Cord- ABO/Rh	Cord- ABO/Rh	2,474	2,625	2,906	1,733	1,411
Total # of Specimens Tested		**33,955**	**32,350**	**29,985**	**27,665**	**26,691**
Total # of Patients Tested		**24,079**	**23,360**	**24,793**	**22,393**	**21,889**

Figure 1: Total Perinatal Specimens Tested



D. Antibodies Identified

In 2022, a total of 218 antibodies were reported (see *Table 2*). This is slightly more than 2021 where 192 antibodies were reported. One ninety-one women had antibodies identified during their pregnancies (slightly increased from 181 women in 2021). Breakdown of antibodies identified within the 191 women consisted of 203 clinically significant antibodies and 15 clinically insignificant antibodies. Forty-three women had multiple clinically significant antibodies. Passive anti-D data has been excluded from the preceding numbers.

Antibodies identified were considered clinically significant if they have been reported to cause HDFN. The most common clinically significant antibodies identified were anti-E, anti-K, anti-D, anti-JKa, (see *Figure 3*) which together represented 72.4% of the total antibodies identified.

Titres for 4 of the clinically significant antibodies increased from non-critical to critical levels during the pregnancy with a total of 18 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 (Including Passive D) – (Current Year) 2022					
Clinically Significant Antibodies	**2018**	**2019**	**2020**	**2021**	**2022**
Anti-D	11	16	19	11	17
Anti-C	10	6	10	21	9
Anti-C^{w}	0	0	0	0	1
Anti-Ce	0	0	1	1	1
Anti-ce	1	0	0	0	0
Anti-c	12	11	6	5	10
Anti-E	64	69	74	68	81
Anti-e	6	6	2	4	3
Anti-f	1	0	0	0	0
Anti-G	2	3	3	2	3
Anti-Ge3	1	0	0	1	0
Anti-K	58	51	43	36	37
Anti-Kp^{a}	0	1	0	0	0
Anti-Kp^{b}	0	0	0	0	0
Anti Lu^{a}	0	0	0	0	0
Anti-Lu^{b}	0	1	0	0	0
Anti-M*	16	14	18	13	11
Anti-S	7	6	6	7	6
Anti-s	0	1	1	0	1
Anti-Fy^{a}	4	2	4	2	3
Anti-Fy^{b}	4	1	2	0	1

Maternal Antibodies Identified (Including Passive D) – (Current Year) 2022					
Clinically Significant Antibodies	**2018**	**2019**	**2020**	**2021**	**2022**
Anti-Jk^{a}	17	13	17	6	12
Anti-Jk^{b}	4	1	4	4	3
Anti-Jk^{3}	0	0	0	0	1
Anti-Di^{a}	1	1	0	0	0
Anti-Di^{b}	1	1	0	0	0
Anti Mi^{a}	1	0	0	0	0
Anti-U	0	0	0	1	1
Anti-V	1	0	0	0	0
Anti-Wr^{a}	1	2	2	1	1
Anti-He	0	0	0	0	1
Total	**223**	**206**	**212**	**183**	**203**

***Anti-M – IgG antibody detected**

Maternal Antibodies Identified (Including Passive D) – (Current Year) 2022					
Clinically Insignificant Antibodies	**2018**	**2019**	**2020**	**2021**	**2022**
Anti-A_1	0	0	0	0	0
Anti-He	0	0	0	0	0
Anti-JMH	1	1	0	1	1
Anti-Le^{a}	17	13	8	7	13
Anti-Le^{b}	2	1	0	0	1
Anti-N	1	1	0	0	0
Anti-P_1	2	0	1	1	0
Passive Anti-D (not included in totals)	763	665	248	212	153
TOTAL: Clinically Insignificant Antibodies	**23**	**16**	**16**	**9**	**15**

Figure 2: Total Number of Perinatal Antibodies

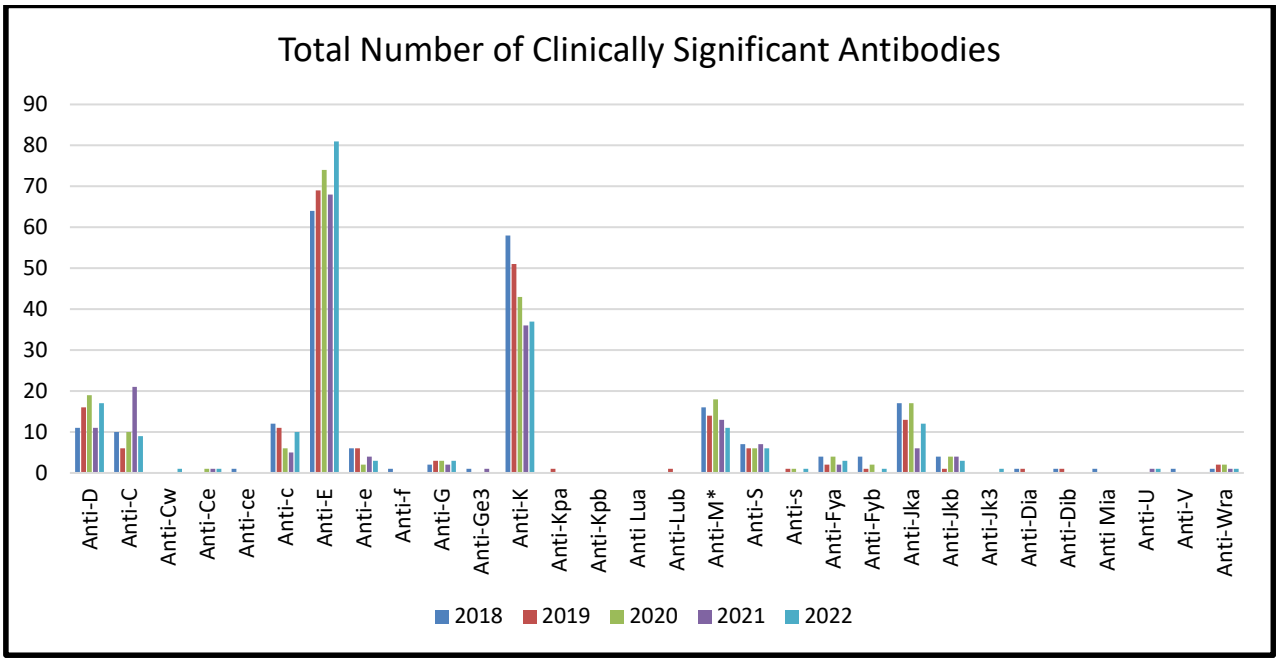


Figure 3: Frequency of Clinically Significant Antibodies

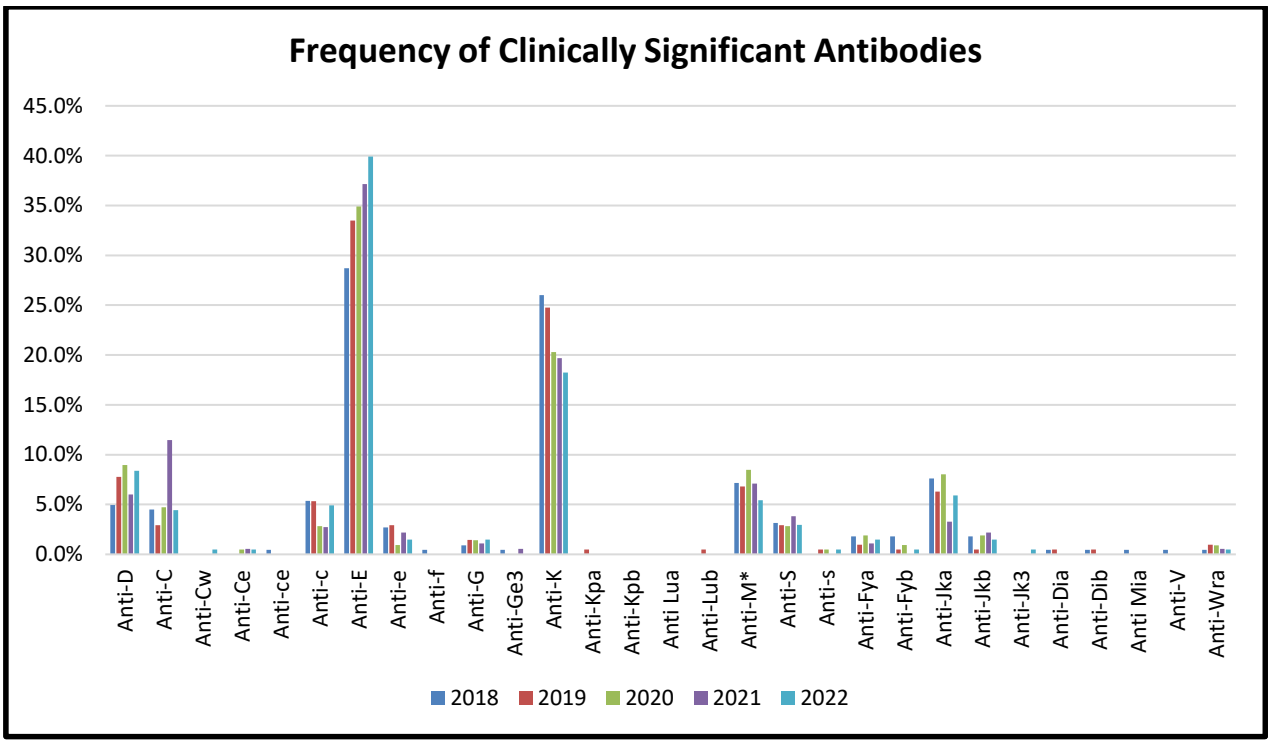


Table 3: Perinatal Patient Antibody Titres 2022

Antibody	Critical Level	Non-Critical Level	Non-Critical to Critical
Anti-D	9	8	2
Anti-C	0	2	0
Anti-E	2	49	0
Anti-c	0	8	0
Anti-e	0	2	0
Anti-DC	0	0	0
Anti-Cw	0	1	0
Anti-Ec	2	9	1
Anti-Ce	0	3	0
Anti-G	0	0	0
Anti-DG	0	1	0
Anti-Wra	1	0	1
Anti-K*	3	3	0
Anti-Fya	1	3	0
Anti-Fyb	0	0	0
Anti-Jka	0	8	0
Anti-Jkb	0	2	0
Anti-M	0	5	0
Anti-S	0	7	0
Anti-s	0	1	0

***Note:** Anti-K is considered critical at any titre. Antibody titres for Kell system antibodies may be performed in Manitoba after consultation with the Medical Officer

Table 4: Perinatal Patient Combination Antibodies 2022

Combination Antibodies	Total
Anti-C, Anti-E	0
Anti-C, Anti-e	2
Anti-c, Anti-E, Anti-Jka	1
Anti-c, Anti-S	1
Anti-C, Anti-G	1
Anti-c, Anti-K	1
Anti-C, Anti-M	1
Anti-C, Anti-Jkb	1
Anti-D, Anti-C, Anti-M	1
Anti-D, Anti-C	2
Anti-D, Anti-Fya	1
Anti-D, Anti-G	2
Anti-E, Anti-c	9
Anti-E, Anti-Cw	1
Anti-E, Anti-c, Anti-K	1
Anti-C, Anti-K, Anti-S	1
Anti-E, Anti-Fya	1
Anti-E, Anti-Jka	1
Anti-E, Anti-K	1

Combination Antibodies	Total
Anti-e, Anti-K	1
Anti-E, Anti-Fyb	1
Anti-E, Anti-S	1
Anti-E, Anti-Wra	1
Anti-Fya, Anti-Jkb	1
Anti-E, Anti-Jk3	1
Anti-E, Anti-Jka, Anti-Lea	1
Anti-M, Anti-He	1
Anti-S, Anti-Jkb	1
Total	38

CROSSMATCH / REFERENCE LABORATORY

The Crossmatch/ Reference Laboratory Winnipeg Red Cell Serology, Diagnostic Services provides centralized transfusion medicine services and testing to approximately 66 hospitals in Manitoba and eastern Nunavut that do not perform these tests. Reference services are provided for 4 rural hospitals with crossmatching laboratories in Manitoba and 12 hospitals in Northwest Ontario. 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 2022, hospitals have referred 178 requests for red cell antibody identification.

Referring hospitals have different capabilities and expertise in resolving red cell antibody investigations.

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. When a new antibody is identified by the Diagnostic Services laboratory a patient wallet card may be provided.

A. Testing Performed

The Crossmatch/Reference Laboratory routinely performs the following tests:

- ABO/Rh blood type
- Screen for red blood cell antibodies
- Antibody Identification, if antibodies are detected
- Crossmatch, electronic and serological
- Isohemagglutinin Titre
- Phenotyping (patient and donor units)
- Transfusion Reaction Investigation
- Direct Antiglobulin Test
- Elution and Absorption
- Cold Agglutinin Screen
- Thermal Amplitude

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. PEG IAT is also the manual back-up method for antibody screening.

The Red Cell Serology (Crossmatch) Laboratory distributes both stock and crossmatched red cell and platelet components to those hospitals which receive all of their transfusion medicine services from Canadian Blood Services.
The Crossmatch Laboratory performs complex antibody investigations and distributes crossmatch compatible (or least incompatible) red cell units.

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).

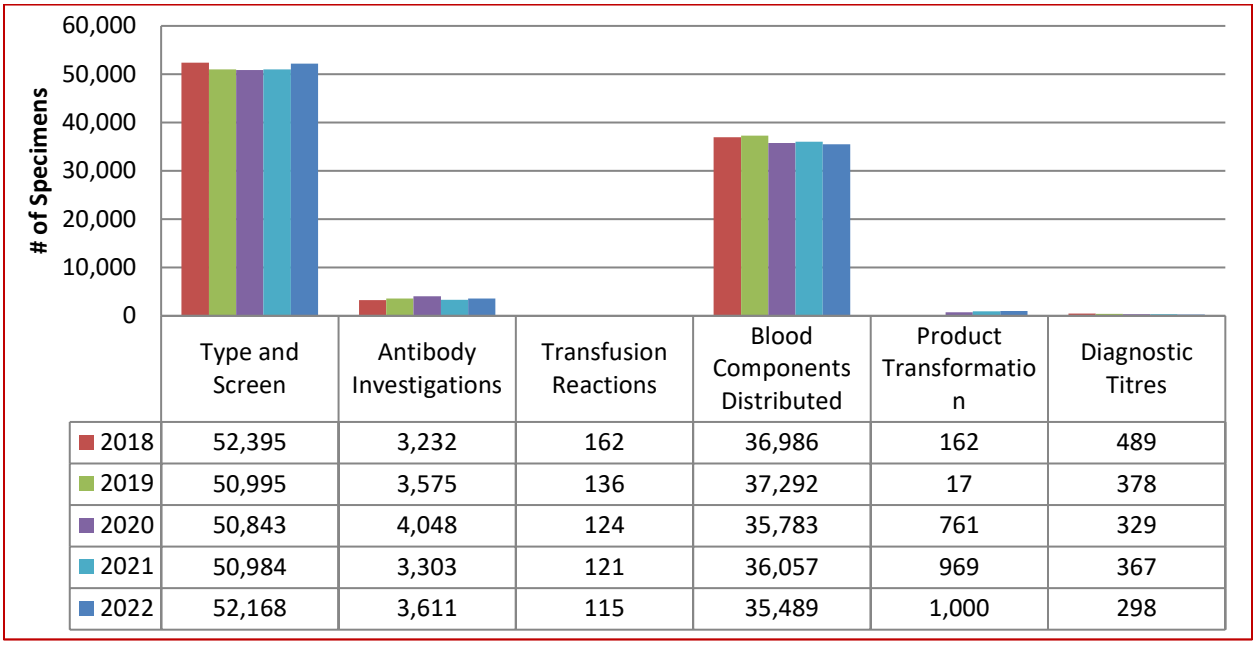
The total number of crossmatch specimens tested has remained consistent over the last 4 years as illustrated in *Table 5* below. The implementation of the Trace Line laboratory information system (LIS) was completed at 16 hospitals in Winnipeg and rural Manitoba in 2015. These hospitals now hold a stock inventory of red blood cell components and perform electronic crossmatch on demand; thus, reducing the number of red blood cells issued and reserved for specific patients on hand in the hospital Blood Bank. The number of red blood cell components distributed has stabilized as hospitals appear to have adjusted inventories to optimal levels. As part of Choosing Wisely Canada, a "Just One" campaign that highlighted "Why give two when one will do?" was rolled out in late 2018 at the Winnipeg tertiary care facilities which may have contributed to the reduction in red blood cell utilization.

The spike in number of product transformation is a result of the implementation of Red Cell aliquots in January 2020. The lab will prepare and provide small volume red cell aliquots for neonatal and pediatric transfusion.

Table 5: Crossmatch/Reference Specimens Tested

Specimen Type	2018	2019	2020	2021	2022
Type and Screen	52,395	50,995	50,843	50,984	52,168
Antibody Investigations	3,232	3,575	4,048	3,303	3,611
Transfusion Reactions	162	136	124	121	115
Blood Components Distributed	36,986	37,292	35,783	36,057	35,489
Product Transformation	162	17	761	969	1,000
Diagnostic Titres	489	378	329	367	298
Test Totals (excluding components distributed)	**56,440**	**55,101**	**56,105**	**55,744**	**56,192**
Patients Tested	**31,025**	**29,528**	**27,617**	**28,020**	**27,203**

Figure 4: Total Crossmatch Specimens Tested



	Type and Screen	Antibody Investigations	Transfusion Reactions	Blood Components Distributed	Product Transformation	Diagnostic Titres
2018	52,395	3,232	162	36,986	162	489
2019	50,995	3,575	136	37,292	17	378
2020	50,843	4,048	124	35,783	761	329
2021	50,984	3,303	121	36,057	969	367
2022	52,168	3,611	115	35,489	1,000	298

C. Antibodies Identified

In 2022, total of 889 antibodies clinically significant and insignificant antibodies were reported (see *Table 6*). The distribution of the most common antibodies remains consistent. Six hundred and seventy-three patients had clinically significant antibodies identified, of these; 331 patients had multiple antibodies.

The difference in number of antibodies detected since 2019 is a reflective of a process change in reporting made in the lab in February 2020 and may not represent a significant increase in the rate of antibodies being detected. This change in process did not affect the reporting of Perinatal antibodies, therefore the jump in number is not observed in that patient population.

Antibodies identified were considered clinically significant if they have been reported to cause acute or delayed hemolytic transfusion reactions. The most common clinically significant antibodies identified were: anti-E, anti-K, anti-D, anti-C, anti-Jka, and anti-e, (see *Figure 5*).

Figure 5: Total Number of Crossmatch Antibodies

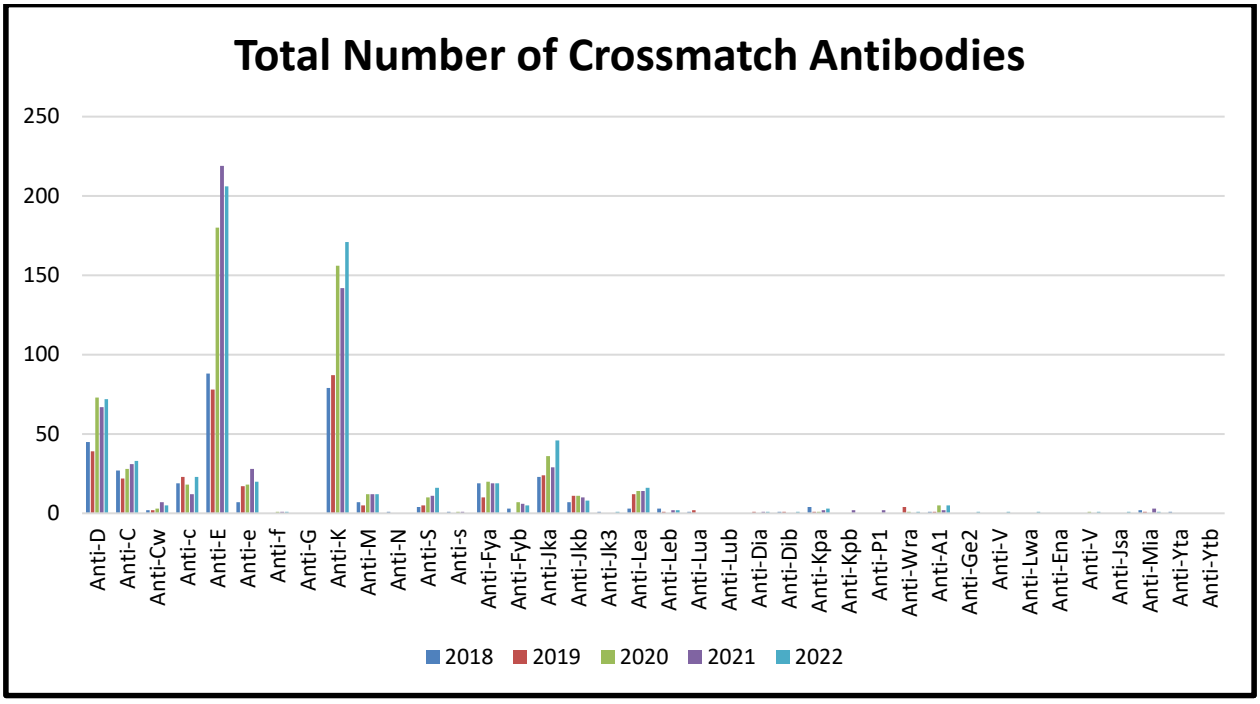


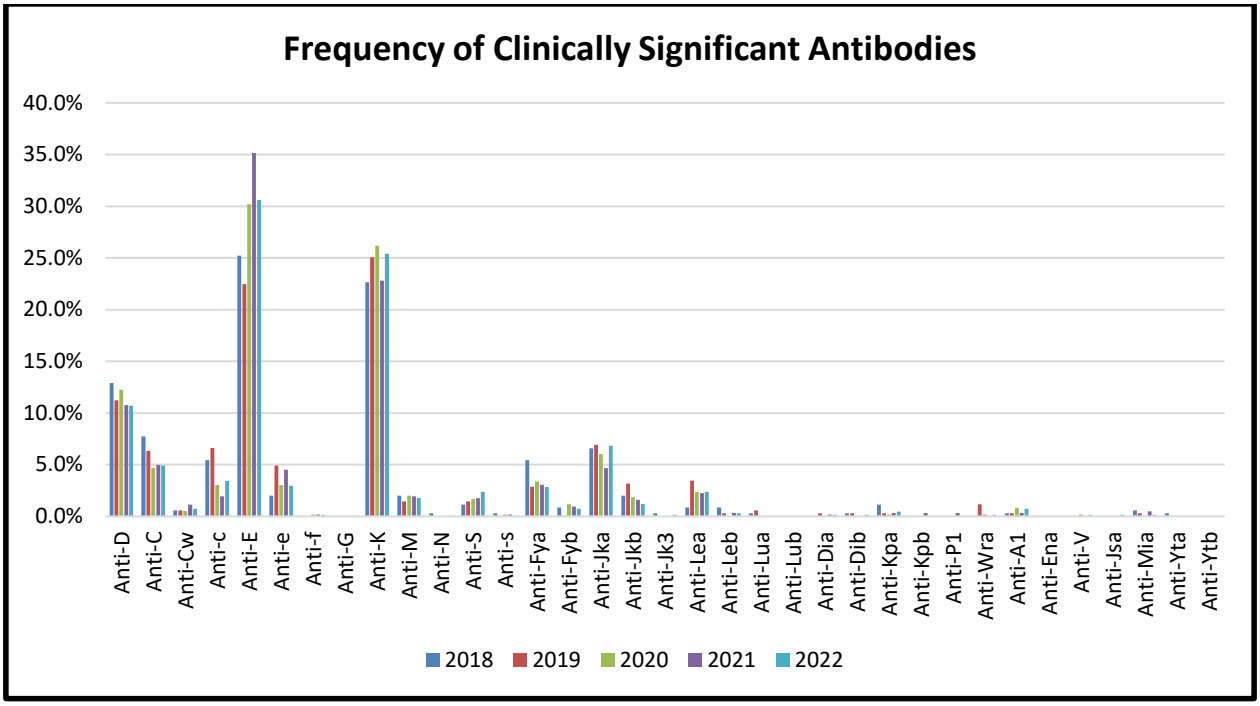
Table 6: Total Number of Crossmatch Antibodies Detected

Reference Antibodies Identified (Including Passive D) – 2022					
Clinically Significant Antibodies	**2018**	**2019**	**2020**	**2021**	**2022**
Anti-D	45	39	73	67	72
Anti-C	27	22	28	31	33
Anti-C^{w}	2	2	3	7	5
Anti-c	19	23	18	12	23
Anti-E	88	78	180	219	206
Anti-e	7	17	18	28	20
Anti-f	0	0	1	1	1
Anti-G	0	0	0	0	0
Anti-K	79	87	156	142	171
Anti-M	7	5	12	12	12
Anti-N	1	0	0	0	0
Anti-S	4	5	10	11	16
Anti-s	1	0	1	1	0
Anti-Fy^{a}	19	10	20	19	19
Anti-Fy^{b}	3	0	7	6	5
Anti-Jk^{a}	23	24	36	29	46
Anti-Jk^{b}	7	11	11	10	8
Anti-Jk^{3}	1	0	0	0	1
Anti-Le^{a}	3	12	14	14	16
Anti-Le^{b}	3	1	0	2	2
Anti-Lu^{a}	1	2	0	0	0

Reference Antibodies Identified (Including Passive D) – 2022					
Clinically Significant Antibodies	**2018**	**2019**	**2020**	**2021**	**2022**
Anti-Lu^{b}	0	0	0	0	0
Anti-Di^{a}	0	1	0	1	1
Anti-Di^{b}	1	1	0	0	1
Anti-Kp^{a}	4	1	1	2	3
Anti-Kp^{b}	0	0	0	2	0
Anti-P_1	0	0	0	2	0
Anti-Wr^{a}	0	4	1	0	1
Anti-A_1	1	1	5	2	5
Anti-Ge2	0	0	0	0	1
Anti-V	0	0	0	0	1
Anti-Lwa	0	0	0	0	1
Anti-En^{a}	0	0	0	0	0
Anti-V	0	0	1	0	1
Anti-Jsa	0	0	0	0	1
Anti-Mia	2	1	0	3	1
Anti-Yta	1	0	0	0	0
Anti-Ytb	0	0	0	0	0
Total	**349**	**347**	**596**	**623**	**673**

***** The difference in number of antibodies noted since 2019 is a reflective of a process change in reporting and may not represent a significant increase in the rate of antibodies being detected.

Figure 6: Frequency of Clinically Significant Antibodies 2022



PLATELET IMMUNOLOGY LABORATORY

The Platelet Immunology Laboratory within Diagnostic Services at Canadian Blood Services provides human leukocyte (HLA) and platelet specific (HPA) antigen typing and antibody investigation testing to assist health care providers in the management of thrombocytopenic patients who have become refractory to vital platelet transfusions, patients affected by neonatal alloimmune thrombocytopenia and autoimmune disorders and patients suspected to have had platelet antibody mediated adverse transfusion events such as post transfusion purpura (PTP). The Laboratory also performs testing on patients and donors for the investigation of Transfusion Related Acute Lung Injury (TRALI). The Laboratory provides service to all Manitoba hospitals and is a national reference lab for any hospital in Canada requiring these testing services.
In addition, the Laboratory also performs HLA and HPA typing on blood donors prior to being placed onto a national platelet donor registry. The registry is used to conduct searches to identify suitably compatible donors who can be used for patients that show no benefit from conventional platelet components.

A. Testing Performed

The Platelet Immunology Laboratory routinely performs the following tests:

- HLA Antigen Typing
- HLA Antibody Screen
- HLA Antibody Identification, if antibodies are detected
- HLA Antigen Typing for disease association
- HPA Typing
- HPA Screening
- HPA Antibody Identification, if antibodies are detected
- Platelet Crossmatch
- Selection of HLA/HPA Compatible Donors for Platelet Transfusion

HLA antibody screening and identification is performed using Luminex bead technology. Whereas HPA antibody screening, identification and crossmatching are performed using a solid phase platform, commercial ELISA kits and the MAIPA method.

A combination of Luminex® multiplex technology, Bioarray eMAP® (Elongation-mediated Multiplexed Analysis of Polymorphisms) technology and/or MicroSSP are the primary HLA and HPA genotyping methods utilized for genotyping both patients and donors.

Selection lists of HLA/HPA compatible donors for patients' requiring platelet transfusion support are generated by the Platelet Immunology Lab using the national platelet donor database.

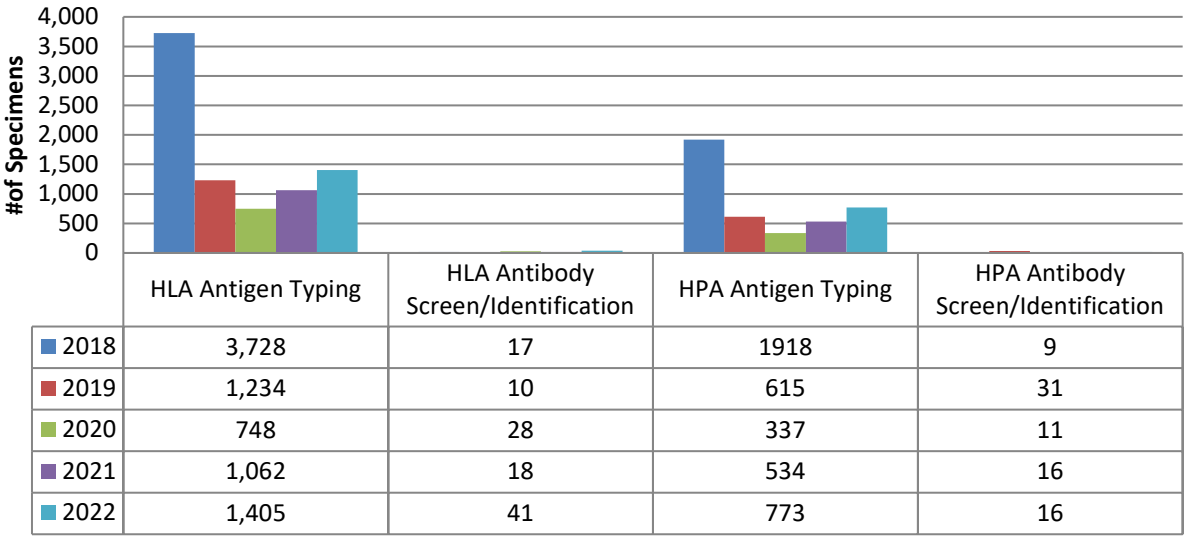
B. Specimens Tested

Table 7 below illustrates the total number of Platelet Immunology specimens tested.

Table 7: Platelet Immunology Specimens Tested

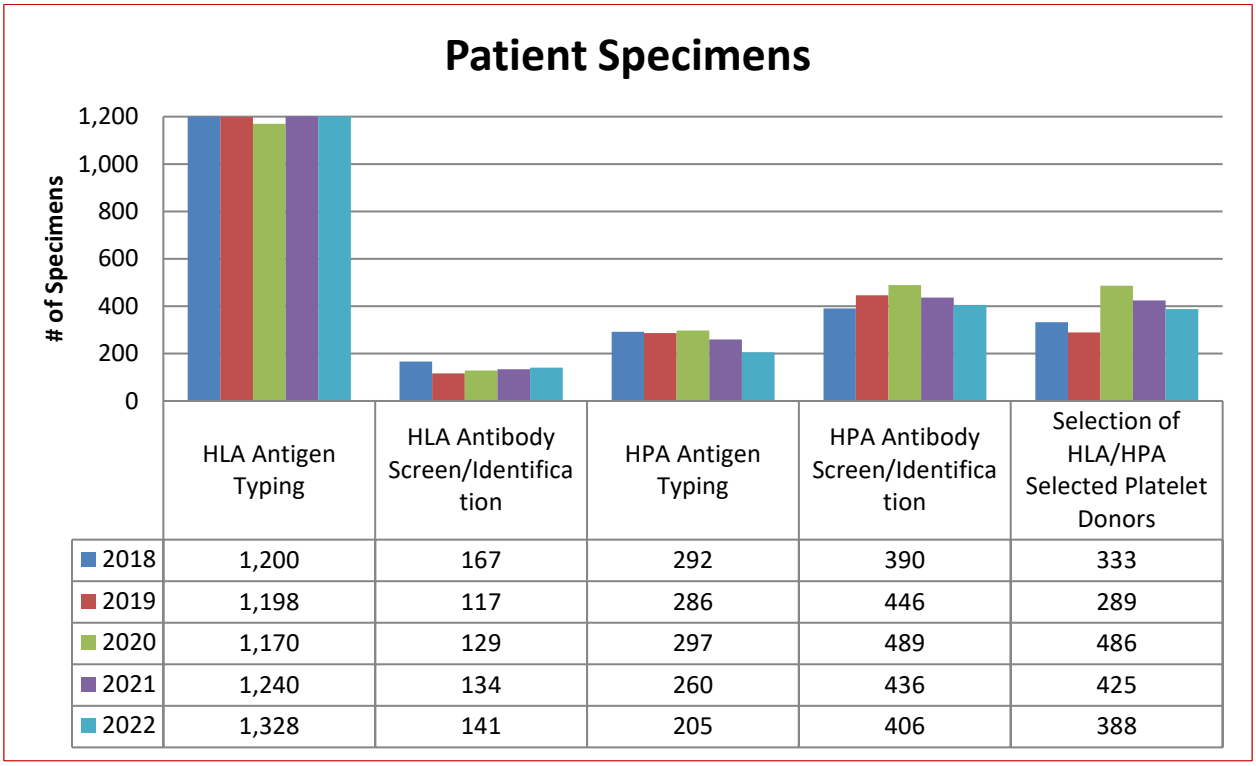
Specimen Type		2018	2019	2020	2021	2022
Donor	HLA Antigen Typing	3,728	1,234	748	1,062	1,405
	HLA Antibody Screen/Identification	17	10	28	18	41
	HPA Antigen Typing	1918	615	337	534	773
	HPA Antibody Screen/Identification	9	31	11	16	16
Test Totals		**5,672**	**1,890**	**1,124**	**1,630**	**2,235**
Patient	HLA Antigen Typing	1,200	1,198	1,170	1,240	1,328
	HLA Antibody Screen/Identification	167	117	129	134	141
	HPA Antigen Typing	292	286	297	260	205
	HPA Antibody Screen/Identification	390	446	489	436	406
	Selection of HLA/HPA Selected Platelet Donors	333	289	486	425	388
Test Totals		**2,382**	**2,336**	**2,571**	**2,495**	**2,468**

Figure 7: Total Platelet Immunology Donor Specimens Tested



	HLA Antigen Typing	HLA Antibody Screen/Identification	HPA Antigen Typing	HPA Antibody Screen/Identification
2018	3,728	17	1918	9
2019	1,234	10	615	31
2020	748	28	337	11
2021	1,062	18	534	16
2022	1,405	41	773	16

Figure 8: Total Platelet Immunology Patient Specimens Tested



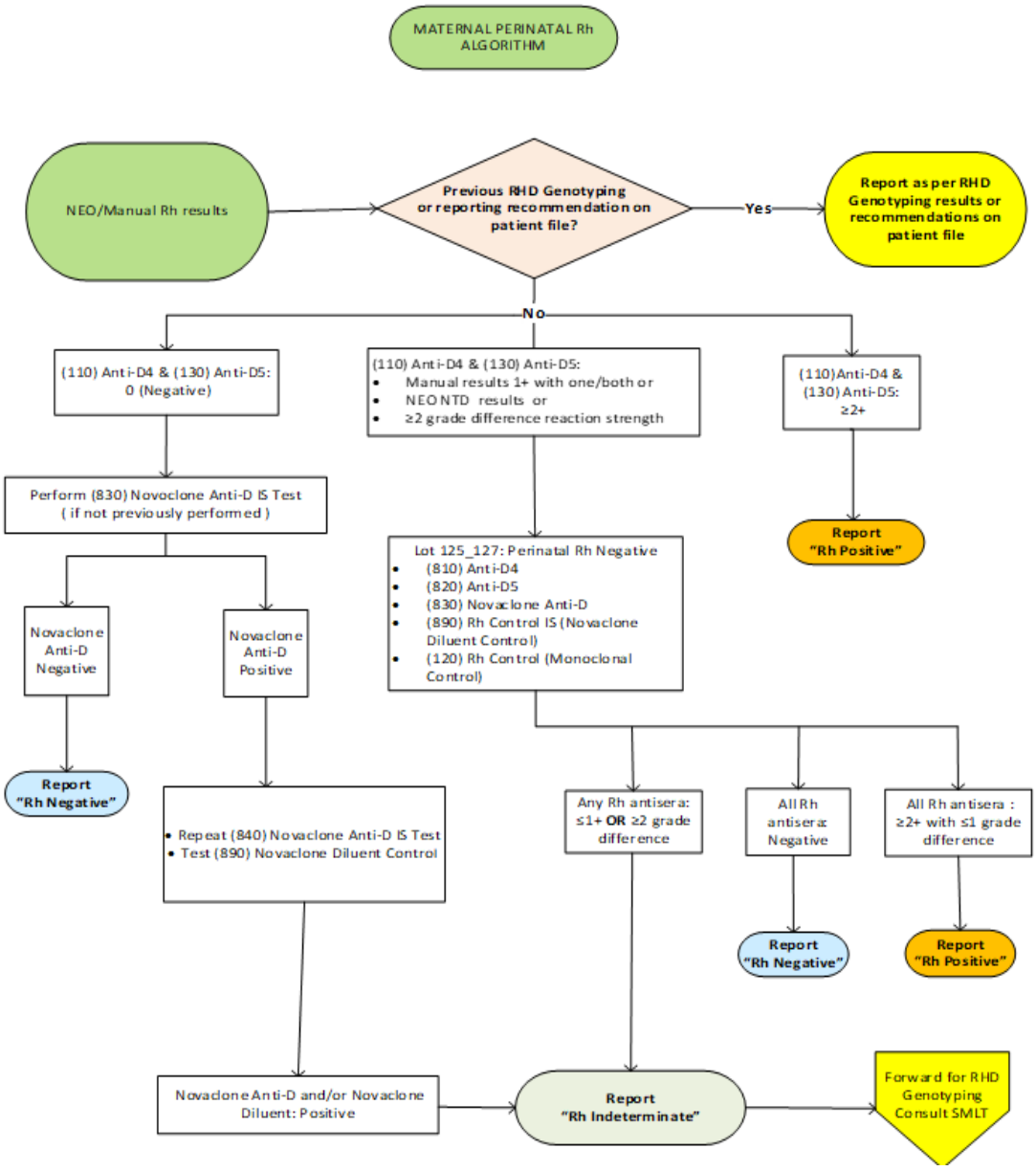
	HLA Antigen Typing	HLA Antibody Screen/Identification	HPA Antigen Typing	HPA Antibody Screen/Identification	Selection of HLA/HPA Selected Platelet Donors
2018	1,200	167	292	390	333
2019	1,198	117	286	446	289
2020	1,170	129	297	489	486
2021	1,240	134	260	436	425
2022	1,328	141	205	406	388

RED CELL GENOTYPING

Canadian Blood Services is able to provide red cell antigen genotyping services through our National Immunohematology Reference Laboratory (NIRL) and Edmonton Diagnostic Services Laboratory. This service is used to aid in resolving complex immunohematology cases. Molecular testing combined with hemagglutination testing can provide better resolution to serological problems and guide patient transfusion requirements in some circumstances especially for sickle cell patients and patients with chronic transfusion requirements and multiple or complex antibodies.

Based on the following testing algorithm patients with serologically variable Rh D typing results may require genetic testing for the RHD gene.

Figure 9: Rh D Testing Algorithm



For 2022, the following results were obtained in patients using one of the two red cell antigen genotyping platforms available at CBS:

Table 8: Patient # - RHD Type/Result 2022

Patient	RHD Genotype	Predicted Phenotype	RHD Sequencing	Rh(D) Group
1	Weak D type 4.0 or 4.3		RHD*09.03 or RHD*09.05	Negative
2	Weak D type 1	Weak D	RHD*01W.1	Positive
3	Weak D type 1	Weak D	RHD*01W.1	Positive
4	Weak D type 1	Weak D	RHD*01W.1	Positive
5	Weak D type 3	Weak D	RHD*01W.3	Positive
6	Weak D type 1	Weak D	RHD*01W.1	Positive
7	Normal RHD/ RHD psi (Pseudogene)		RHD*01/ RHD*08N.01	Positive
8	Weak D type 1	Weak D	RHD*01W.1	Positive
9	Weak D type 3	Weak D	RHD*01W.3	Positive
10	Weak D type 1	Weak D	RHD*01W.1	Positive
11	RHD deletion with DVII.1		RHD*01N.01 with RHD*07.01	Negative
12	Weak D type 3	Weak D	RHD*01W.3	Positive
13	Weak D type 1	Weak D	RHD*01W.1	Positive
14	Weak D type 3	Weak D	RHD*01W.3	Positive
15	Weak D type 1	Weak D	RHD*01W.1	Positive
16	Weak D type 1	Weak D	RHD*01W.1	Positive
17	Weak D type 2	Weak D	RHD*01W.2	Positive
18	Weak D type 1	Weak D	RHD*01W.1	Positive
19	No RHD variants detected			Negative
20	DAU3		RHD*10.03	Negative
21	RHD psi (Pseudogene)/ Weak D type 4.0 or 4.3		RHD*01N.01/ RHD*09.03 or RHD*09.05	Negative
22	Weak D type 1	Weak D	RHD*01W.1	Positive
23	Weak D type 3	Weak D	RHD*01W.3	Positive
24	No RHD variants detected			Negative
25	Weak D type 4.0 or 4.3		RHD*09.03 or RHD*09.05	Negative

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 Winnipeg 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 9: Turnaround Time – Routine Criteria by Specimen Type

Specimen Type	Expected Turnaround Time	Expected % of Specimens Which Meet or Exceed Expected TAT
Routine Perinatal Specimens	72 hours	85%
Perinatal Specimens with Antibodies	72 hours	85%
Routine Crossmatch Specimens	24 hours	90%
Reference Specimens	72 hours	85%
Routine Platelet Immunology Specimens (NAIT, PTP, Platelet alloimmunization)	14 days	90%
HLA Disease Association Specimens	28 days	90%
HLA B*5701 Specimens	28 days	90%
Donor HLA/HPA Typing Specimens	60 days	90%

Table 10: Turnaround Time – Routine Perinatal Specimens

Turnaround Time (TAT)	2018	2019	2020	2021	2022
% of Specimens Tested within 72 hours	95%	92%	87%	88%	82%
% of Specimens Tested > 72 hours	5%	8%	13%	12%	18%

Table 11: Turnaround Time – Routine Crossmatch Specimens

Turnaround Time (TAT)	2018	2019	2020	2021	2022
% of Specimens Tested within 24 hours	99%	99%	99%	99%	99%
% of Specimens Tested > 24 hours	1%	1%	1%	1%	1%

Table 12: Turnaround Time – Reference Specimens

Turnaround Time (TAT)	2017	2018	2019	2020	2021	2022
% of Specimens Tested within 72 hours	99%	97%	100%	100%	99%	99%
% of Specimens Tested > 72 hours	1%	3%	0%	0%	1%	1%

Table 13: Turnaround Time - Platelet Immunology Specimens

Turnaround Time (TAT)	2018	2019	2020	2021	2022
% of Specimens Tested within 14 days	97%	99%	98%	98%	99%
% of Specimens Tested within 28 days	94%	98%	98%	99%	100%
% of Specimens Tested within 60 days	99%	92%	100%	100%	100%

* Preliminary results reported within 1-2 days of sample receipt.

B. Rejected Specimens

Each time a specimen is rejected, a reason for rejection is entered into our laboratory information system (LIS). This data is then retrieved and analyzed on a quarterly basis.

As described in ***Table 14 and Figure 14*****,** the reasons for rejecting specimens in the Perinatal Laboratory are primarily problems with specimen labelling, requisitions and discrepancies between the requisition and the specimen. Average rejection rates have decreased from a high of 4.4% in 2012 to 3.4% in 2021 which correlates with increased efforts to contact customers and educate them on acceptable labelling criteria.

Table 15 and Figure 15 describe the reasons for rejecting specimens in the Crossmatch Laboratory; the majority of which involve problems with specimens. Problems with specimen labelling and discrepancies between the requisition and the specimen tube label constitute the main reasons for specimen rejection. Missing or incorrect information on the label and discrepancies in the name, personal health number (PHN) or date of collection continue to be the most common specimen labelling errors seen. Specimens are also rejected if the sample is a duplicate. The rejection rate for crossmatch specimens continued to remain low throughout 2021. The average rejection rates have decreased from a high of 2.9% in 2012 to 1.6% in 2022.

The rejection rates for perinatal specimens are higher than for crossmatch (pre-transfusion) specimens. The collection process for crossmatch specimens is controlled with stringent best practices and standards that must be followed. Crossmatch specimens are usually collected in hospitals and are sent to Canadian Blood Services via the hospital blood banks where the samples are pre-screened to determine if there are discrepancies between the sample and requisition. Perinatal specimens are most often collected in clinics and community collection sites where the identification and labelling process may be more variable. Although there may be differences in the collection process all specimens are scrutinized using the same stringent acceptance criteria prior to testing at Canadian Blood Services.

Some specimens for crossmatch have already been rejected by the referring hospital laboratory and total numbers of these rejected specimens are not included in our data.

Table 16 and Figure 16 describe the reasons for rejecting specimens in the Platelet Immunology Laboratory; the majority of which involve specimens. Samples may be rejected because of discrepancies between the specimen and the requisition, they are duplicate specimens that would not be tested; wrong tube type are all common reasons. The numbers represent an average rejection rate between both donor and patient rejections. Efforts to educate hospital customers continued throughout 2021 and 2022.

Table 14: Quarterly Rejection Rates – Perinatal Specimens 2022

Rejection Category	Q1	Q2	Q3	Q4
Requisition	49	43	40	51
Specimen	87	100	140	142
Discrepancies Between Requisition & Specimen	79	64	67	64
Discrepancies Between Current Requisition & Historical Records	15	17	19	16
Other	11	11	2	5
Total # specimens rejected	241	235	268	278
Total # specimens received	7,534	7,032	7,045	6,975
Rejections as a % of total	3.2%	3.3%	3.8%	4.0%

Figure 10: Perinatal Rejection Reasons

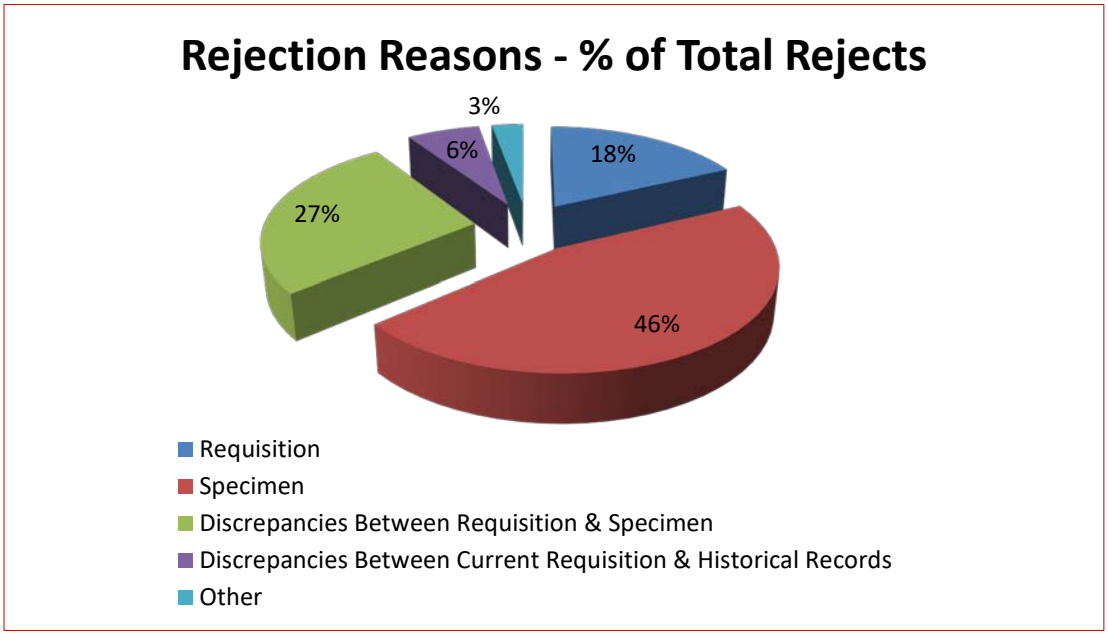


Table 15: Quarterly Rejection Rates – Crossmatch Specimens 2022

Rejection Category	Q1	Q2	Q3	Q4
Requisition	23	34	29	26
Specimen	111	92	153	93
Discrepancies Between Requisition & Specimen	78	71	58	83
Discrepancies Between Current Requisition & Historical Records	6	6	2	3
Other	8	7	9	5
Total # specimens rejected	226	210	251	210
Total # specimens received	13,589	14,400	14,549	14,402
Rejections as a % of total	1.7%	1.5%	1.7%	1.5%

Figure 11: Crossmatch Rejection Reasons 2022

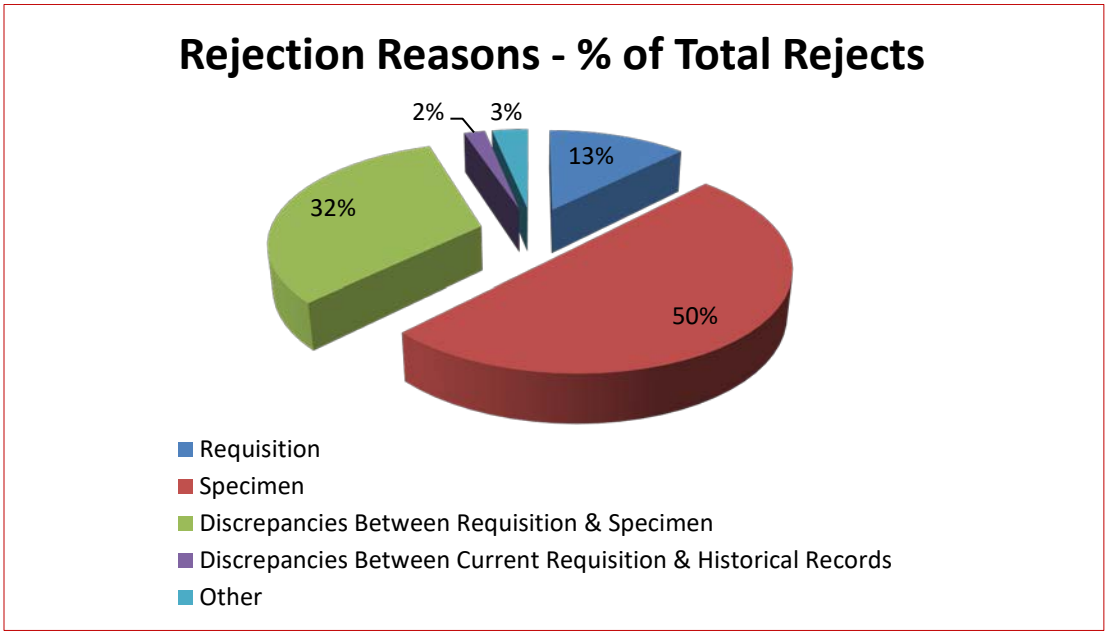


Table 16: Quarterly Rejection Rates – Platelet Immunology Specimens (Patient and Donor) 2022

Rejection Category	Q1	Q2	Q3	Q4
Requisition	0	3	1	2
Specimen	29	40	42	30
Discrepancies Between Requisition & Specimen	7	13	9	3
Discrepancies Between Current Requisition & Historical Records	0	0	0	0
Unable to Enter Results in PROGESA	0	0	0	0
Other	7	11	7	4
Total # specimens rejected	45	70	61	43
Total # specimens received	604	753	629	576
Rejections as a % of total	7.5%	9.3%	9.7%	7.5%

Figure 12: Platelet Immunology Rejection Reasons 2022