



## NOVA SCOTIA PROVINCIAL BLOOD COORDINATING PROGRAM

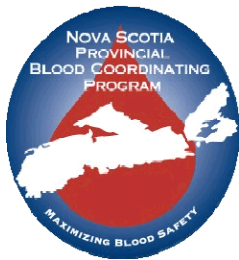
# Nova Scotia Red Blood Cell Report

Reporting  
Q3 2008/09 to Q2 2011/12

July 2012

NOVA SCOTIA





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July 2012

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# 1 Executive Summary

In this report, the Nova Scotia Provincial Blood Coordinating Program provides an overview of the distribution and discards of red blood cells in Nova Scotia from October 1, 2008 to September 30, 2011.

In recent years national red blood cell distribution has decreased by approximately 1%, however based on the first two quarters of 2011/12, an increase of 1.8% is projected. Red blood cell distribution for Nova Scotia has followed the national trend and an increase of 2.3% is projected. The rise in red blood cell distribution in Nova Scotia has been examined and is related to an increase in demand in several District Health Authorities.

Nova Scotia's red blood cell discard rates were between 3-4% each year from 2007/08 to 2010/11. As a result of various initiatives, Nova Scotia's estimated discard rate for 2011/12 has reached an all time low of 2.8%. The District Health Authority's and IWK specific information on the red blood cell distribution and discards is also presented in the report. These are meant to show the progress each District has made in minimizing discards and provide an opportunity for the District Health Authorities and IWK to track the trend in their red blood cell distribution and formulate strategies accordingly.

The successful inventory management in the District Health Authorities of Nova Scotia has resulted in minimizing discards of red blood cells over the last four years. Currently we are unaware of the appropriateness of the utilization of red blood cells. In order to formulate a strategy to optimize the use of red blood cells, there is a need to categorize the transfused red blood cells as appropriate or inappropriate for indications and the number of units transfused.

# 2 Introduction

The Nova Scotia Provincial Blood Coordinating Program (NSPBCP) supports excellence in transfusion medicine. A key area of focus of the NSPBCP is utilization management in order to optimize the appropriate use of blood and blood products and to minimize wastage. Nova Scotia has been one of the highest users of red blood cells in Canada. The high volume of use makes it more important to monitor the disposition of red blood cells. The NSPBCP has been monitoring and reporting red blood cell discards since 2000/01. The program last reported the discards of red blood cells in the second quarter of fiscal year 2008/09. There was a pause in the reporting since the third quarter of fiscal year 2008/09 due to large gaps in the reporting of the disposition data. These gaps were identified and resolved by mutual efforts of Canadian Blood Services and Transfusion Medicine personnel of Nova Scotia and the NSPBCP.

The discard rates of red blood cells in Nova Scotia have fluctuated between 8 and 11% from 2000/01 to 2006/07. Since 2006/07, red blood cell discard rates have steadily declined to a current rate of 2.8%. It has been a great achievement for Nova Scotia as this is the lowest discard rate the Province has ever achieved and is below the provincial target of less than 3%.

This report describes Nova Scotia's current provincial discard rate as well as the District Health Authority/IWK red blood cell discards. The reporting period of this report is from October 1, 2008 to September 30, 2011

Blood type O and A are the most common blood types in Canada. There are challenges in maintaining an adequate provincial and national supply of type O and A units. In order to overcome this challenge, Canadian Blood Services has suggested the districts maintain a small stock of type B and AB units to help avoid giving group *compatible* units to recipients who could have had group *specific* transfusions. This may mean that a small inventory of type B and AB units may go unused and ultimately expire, but the impact on the supply of type O and A units is reduced. This is particularly true of O negative units—the universal donor type in emergency situations. To reflect this strategy and to deemphasize B and AB discards that may occur as a result, **type B and AB units have been separated in many of the discard graphs in this report.** The current goal is to keep non-B and non-AB discards below 2 %.

Appendix A shows the formula used to calculate the discard rates presented in this report. A detailed description of the product and use types that are used in the formula can be found in Appendix B.

New to this year's report is the inclusion of units distributed to Nova Scotia hospitals by Canadian Blood Services, its trend over the past fiscal years as well as its comparison with the national figures. The details of units distributed, annual variance in distribution and discards at the level of District Health Authorities of Nova Scotia and the IWK are also presented.

The NSPBCP acknowledges the contributions of the Transfusion Medicine Quality Specialist's in providing disposition data to CBS and to Canadian Blood Services for supplying the NSPBCP with the distribution and disposition data

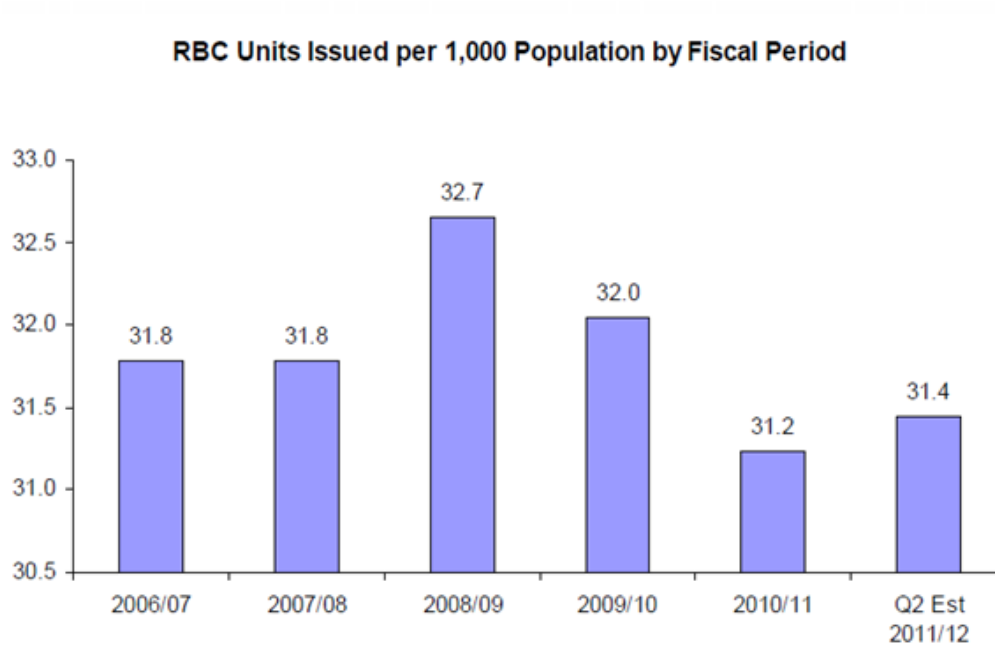
## 3 Distribution Data

### 3.1 The Canadian Perspective

National data and trends serve as a bench mark for comparison of provincial data and may be used for setting target goals. The following figures demonstrate the red blood cells that were issued or distributed and are used as a comparison of overall use.

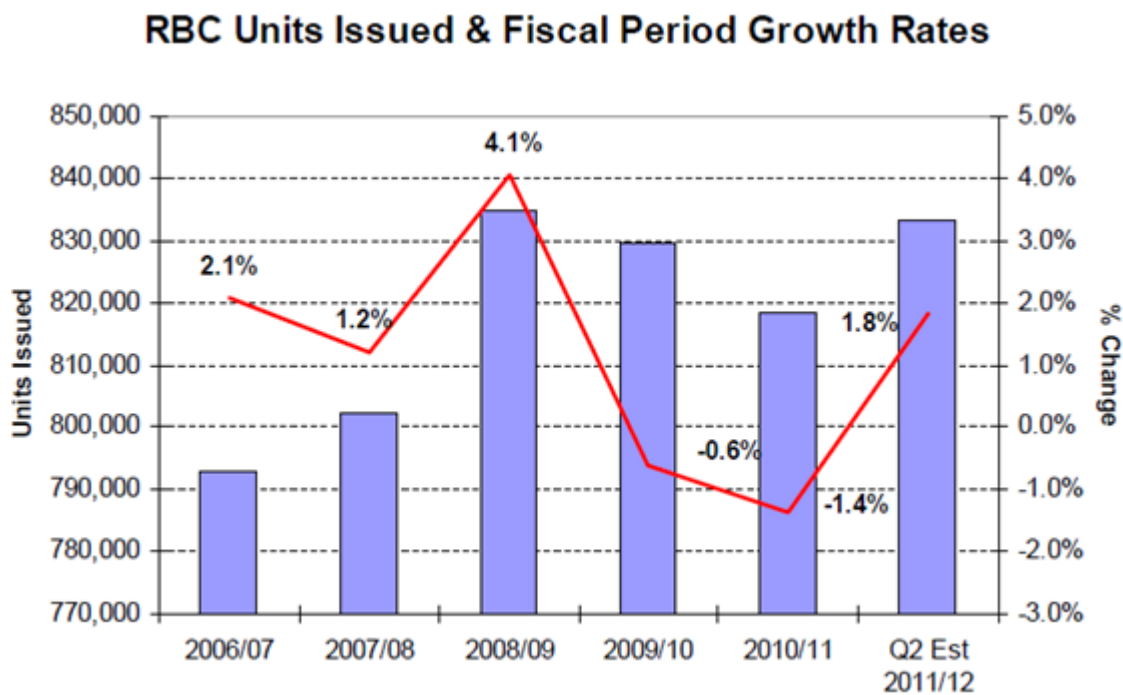
Figure 1 shows a comparison of annual per capita distribution for the last six fiscal years by Canadian Blood Services, the most recent being estimated figures of 2011/12 based on actual Q2 data of 2011/12. The red blood cells issued per 1,000 population has been decreasing since 2008/09 with an estimated rise to 31.4 units/1000 population in 2011/12 which equates to a growth rate of 1.8% as demonstrated in Figure 2.

**Figure 1:**



Source: Canadian Blood Services

**Figure 2:**

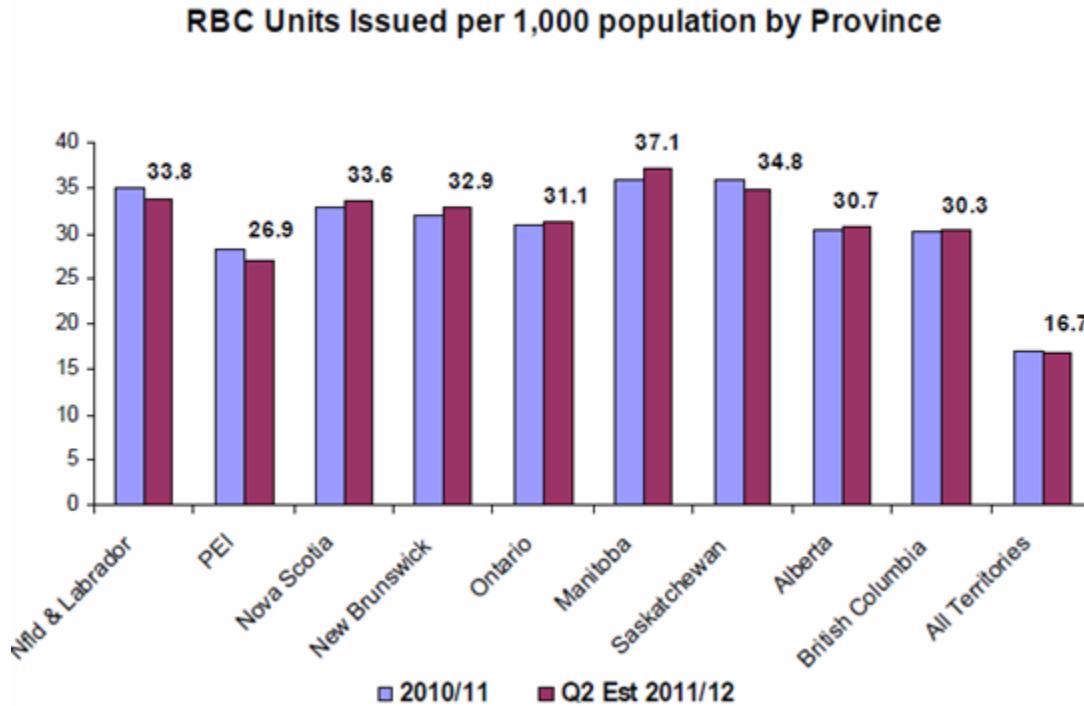


Source: Canadian Blood Services

### 3.2 Provincial Distribution

Canadian Blood Services supplies blood to all provinces in Canada (except Quebec). Figure 3 displays the units of red blood cells per 1000 population distributed to the provinces and territories in fiscal years 2010/11 and 2011/12 (estimate).

Figure 3:



Source: Canadian Blood Services

### 3.3 Provincial Growth Rate

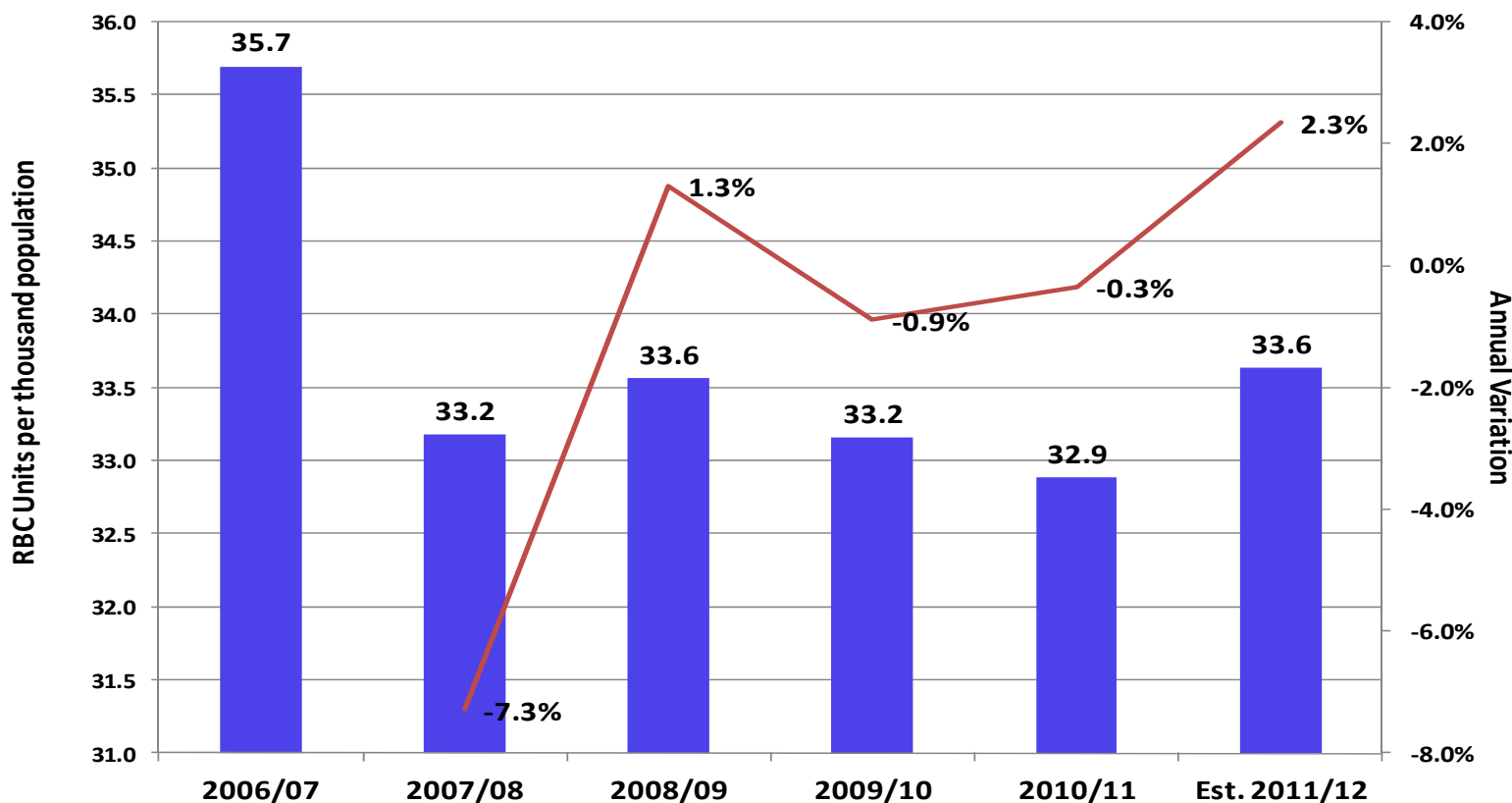
The distribution of units in Nova Scotia followed the national trend for the last four fiscal years since 2008/09. With the trend being the same, the exact units/1000 population has been higher each year when compared to the national figures.

Figure 4 shows the distribution of red blood cells in Nova Scotia was 33.6 units/1000 population in 2008/09, and decreased to 33.2/1000 population in 2009/10. The distribution decreased even further to 32.9/1000 population in 2010/11. Based on actual Q1 and Q2 data, the distribution in Nova Scotia is estimated to increase to 33.6/1000 population in 2011/12.

The figure also shows the variation in the annual percent growth in the distribution of units for Nova Scotia since 2006/07. There was a decline by 7.3% in the growth rate of distribution in Nova Scotia in 2007/08 from 2006/07. This was followed by a rise of 1.3% in 2008/09. The growth rate of red blood cells distributed in Nova Scotia decreased by 0.9% and 0.3% in the following two fiscal years 2009/10 and 2010/11 respectively. The estimated growth rate of distribution in Nova Scotia is positive 2.3% for 2011/12.

**Figure 4:**

**RBC Units Distributed to Nova Scotia per 1,000 population and Fiscal Period Growth Rates**

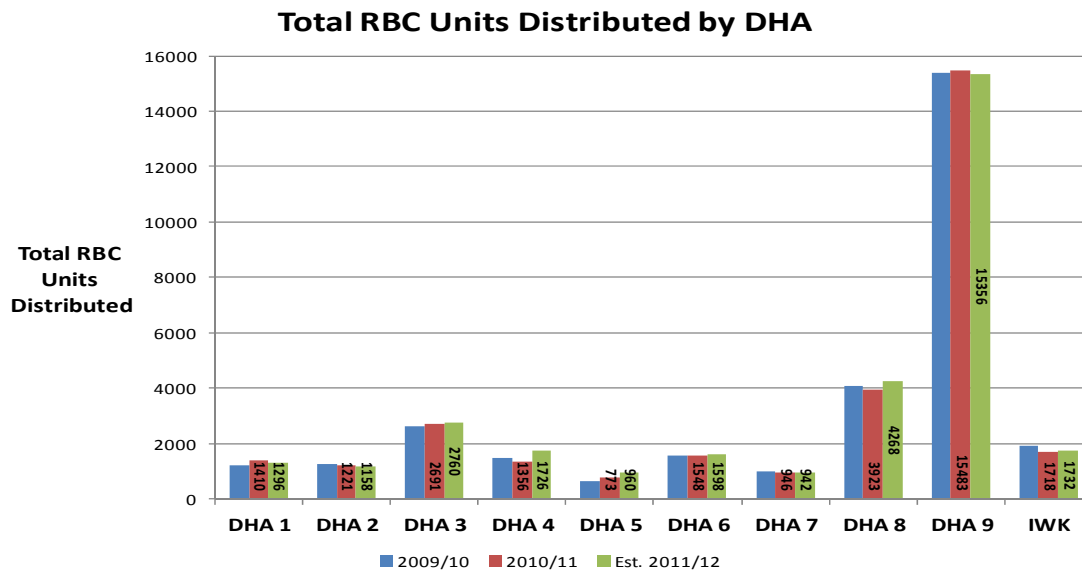




### 3.4 Distribution of Red Blood Cells to the District Health Authorities and the IWK

This section shows the annual comparison of the total units distributed to the District Health Authorities and the IWK in Nova Scotia for the last three fiscal years. Figure 5 shows the total units distributed to District Health Authorities/IWK for fiscal years 2009/10, 2010/11 and 2011/12 (estimated). Based on actual data for the first two quarters of 2011/12, it is estimated that five District Health Authorities will exhibit a rise in distribution during 2011/12 when compared to their own distribution in the last fiscal year 2010/11.

**Figure 5:**



The district health authorities exhibiting a rise in the distribution during 2011/12 attributed it to the rise in transfusions due to various reasons like patients requiring blood for gastrointestinal bleeds, massive transfusions, or an increase in Medical Day patient transfusions.

#### **Recommendation**

It is recommended that the utilization practice be monitored in CDHA and results extrapolated to be used for Nova Scotia to consider formulating a strategy of ordering one unit of red blood cells at a time in stable anemic patients (exclusion applies).

Table 1 shows the total units distributed to each of the District Health Authorities and the IWK in Nova Scotia from fiscal years 2006/07 to 2011/12.

**Table 1:**

### **RBC Units Distributed in Nova Scotia by DHA**

<b>DHA</b>	<b>2006/07</b>	<b>2007/08</b>	<b>2008/09</b>	<b>2009/10</b>	<b>2010/11</b>	<b>Est. 2011/12</b>
DHA 1	1223	1043	1144	1230	1410	1296
DHA 2	1611	1375	1474	1258	1221	1158
DHA 3	2424	2460	2519	2634	2691	2760
DHA 4	1467	1303	1333	1470	1356	1726
DHA 5	649	707	491	634	773	960
DHA 6	1488	1475	1370	1573	1548	1598
DHA 7	1000	872	942	984	946	942
DHA 8	5406	5222	4924	4087	3923	4268
DHA 9	16544	15069	15184	15372	15483	15356
IWK	1672	1523	2074	1934	1718	1732
<b>Total</b>	<b>33484</b>	<b>31049</b>	<b>31455</b>	<b>31176</b>	<b>31069</b>	<b>31796</b>

## **4.0 Red Blood Cell Data**

### **4.1 Data Collection**

The information presented in the remainder of this report is derived from data obtained by the Nova Scotia Provincial Blood Coordinating Program (NSPBCP) from CBS. The following sections provide information regarding the data used to create the graphs and tables and should be considered in the interpretation of the utilization information in this report.

### **4.2 Percent Capture**

Percent capture is used as a data quality indicator and assists in determining if the utilization data is representative of the overall utilization. Percent capture is calculated in the following manner:

$$\frac{\text{the number of units reported as } \textit{utilized} \textit{ (transfused and discarded)}}{\text{the total number of units } \textit{distributed}.$$

Percent capture of the distribution data for Nova Scotia during the time period of this report was 93% in 2008/09; 97% in 2009/10 and 98% each for fiscal years 2010/11 and 2011/2012(Q1+Q2 only).

This high percent capture supports the fact that the utilization data in this report is representative of the actual overall utilization and reflects the continuous cooperation, support and mutual effort of the Transfusion Medicine Quality Specialists, Canadian Blood Services and the NSPBCP.

Table 2 shows the Percent capture of red blood cell utilization for each year since 2006/07 to Q2 of 2011/12 in Nova Scotia.

**Table 2:**  
**Percent Capture of RBC Utilization in Nova Scotia**

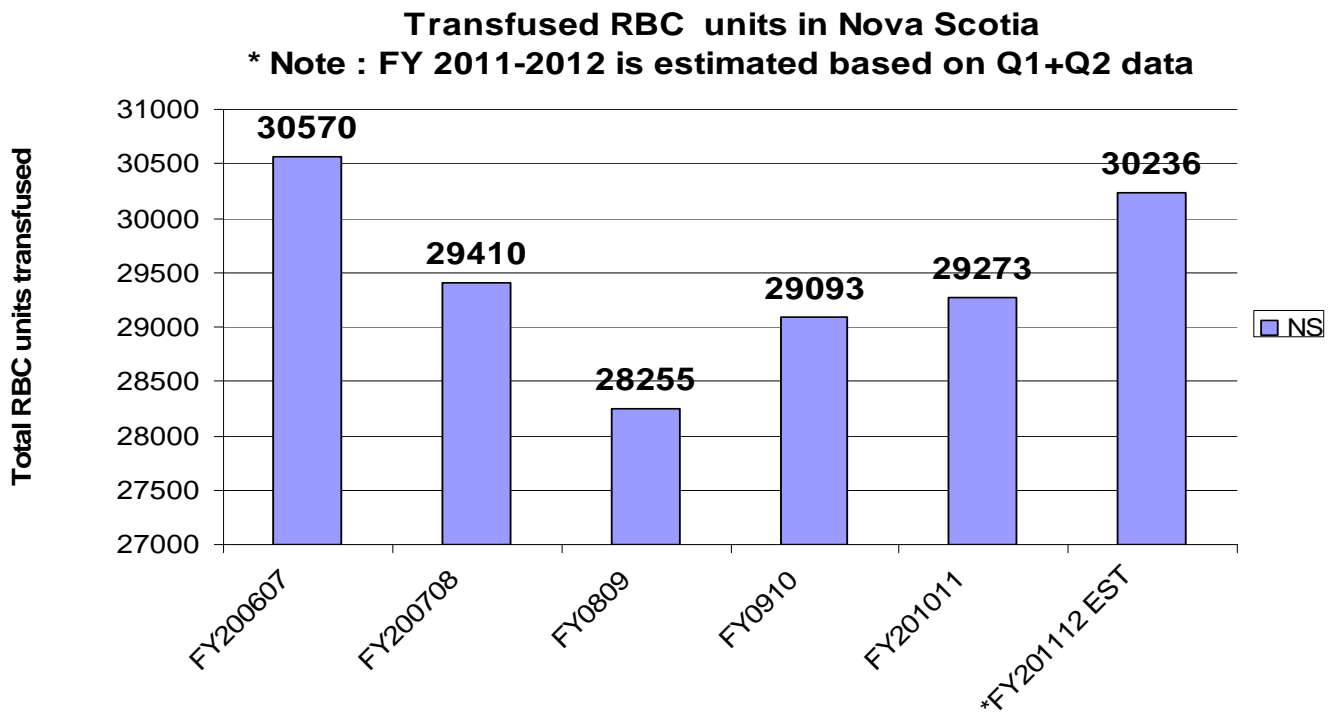
Fiscal Year	Total RBC Units Utilized <i>(transfused + discarded)</i>	Total RBC Units Distributed	Percent Capture
2006/2007	33265	33484	99%
2007/2008	30700	31049	99%
2008/2009	29184	31455	93%
2009/2010	30390	31176	97%
2010/2011	30430	31069	98%
2011/2012 (Q1+Q2 only)	15560	15898	98%

## 5.0 Red Blood Cell Transfusion Data

The NSPBCP receives disposition data from Canadian blood services on a quarterly basis. Total units of red blood cells transfused are derived from this information and presented here.

Fig 6 shows the total annual transfused units in Nova Scotia reported to the NSPBCP since 2006/07 to Q2 of 2011/12. Decreased total units of transfused red blood cells in 2008/09 might be a consequence of a low percent capture in that fiscal year. There has been a gradual rise in the total number of red blood cell units transfused each year from 2009/10 onwards to 2010/11 and 2011/12.

**Figure 6:**



## 6.0 Discard Rates of Red Blood Cell Units in Nova Scotia

Figure 7 shows the annual discard rates in Nova Scotia for the last twelve fiscal years. The improvement in discard rates began in 2005/06 and has carried through to 2008/09. The discard rate fluctuated around 4% in 2009/10 and 2010/11. The discard rates of red blood cells declined even further to an all time best of 2.8% in 2011/12 (estimate based on actual Q1 and Q2). This is below the 3% target discard rate of the NSPBCP.

**Figure 7:**

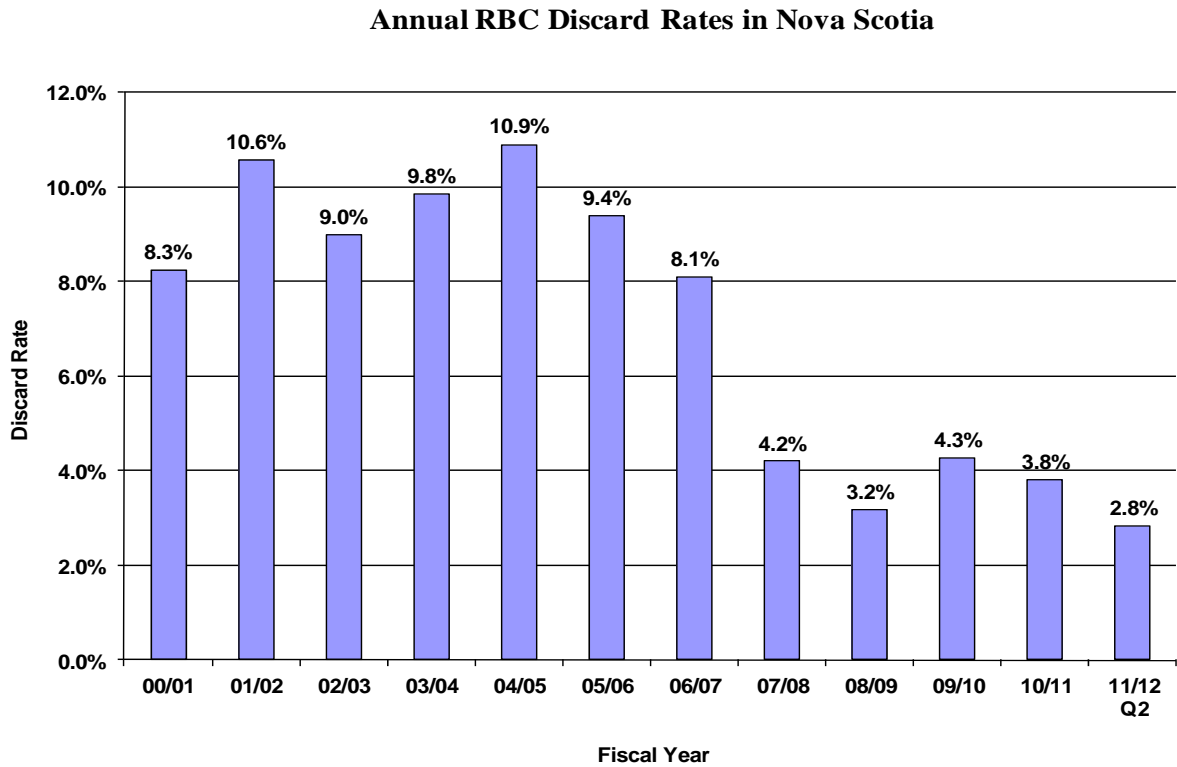


Figure 8 shows the discarded units of red blood cells in Nova Scotia as indate and outdate discards for fiscal year 2006/07 to 2011/12 (estimate). The count of discarded red blood cell units are broken down into indate discards (product discarded prior to the expiry date) and outdate discards (product discarded because the expiry date was reached). There was a decline in total units of red blood cell discards from 2010/11 to 2011/12. This prevented 286 units (1122 discards in 2010/11 minus 836 discarded units in 2011/12) from getting discarded in 2011/12. The improvement in discarded units was more in the outdated category.

**Figure 8:**

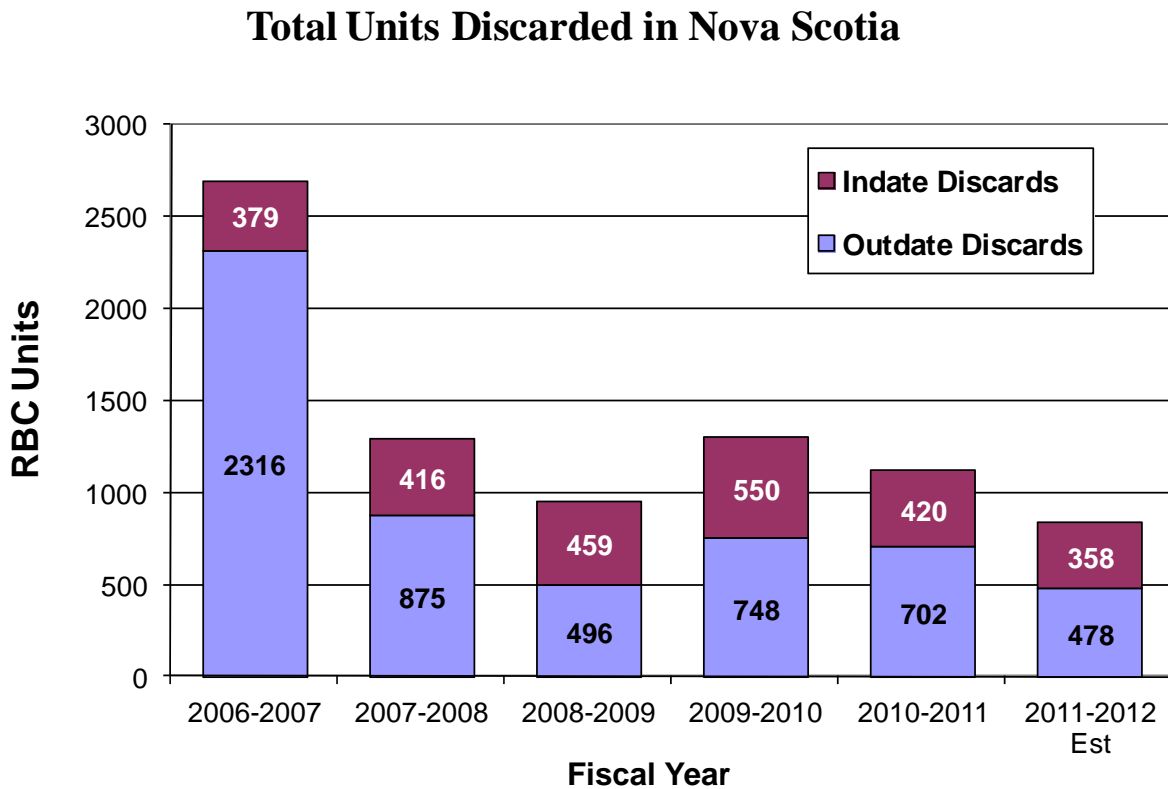
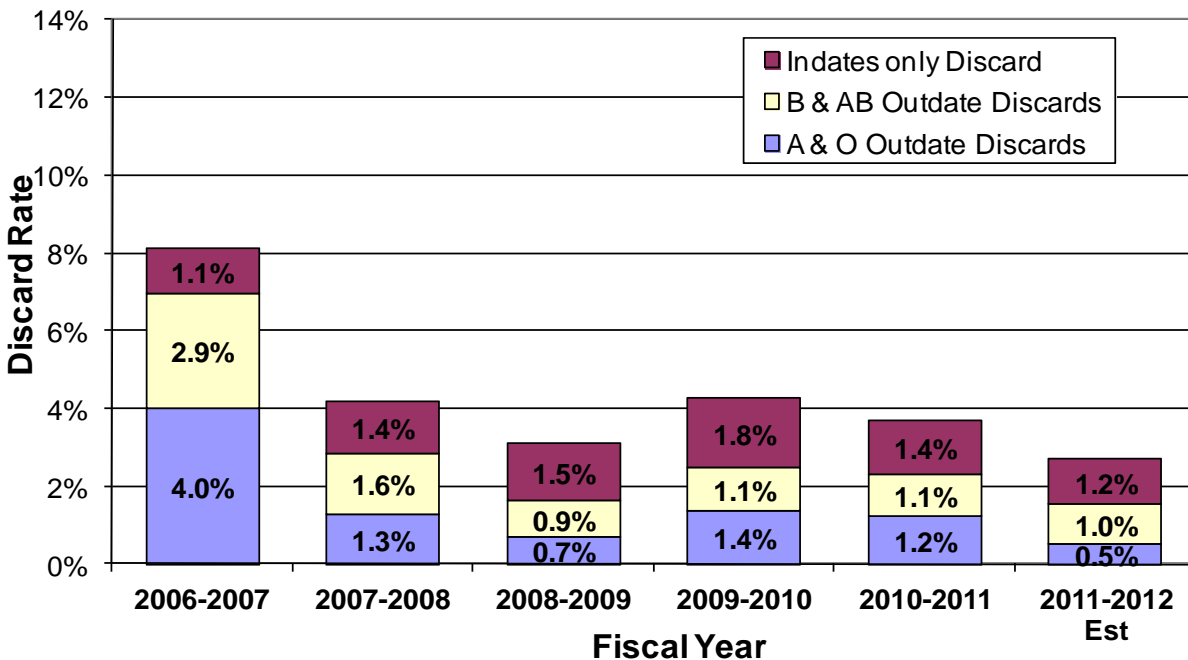


Figure 9 shows the Outdate discards teased out by blood type of B&AB and A&O. There is an improvement in the discard rates of A&O from 1.4% in 09/10 to 0.5% in 11/12 this is in agreement with the goal of NSPBCP to keep non-B and non-AB discards below 2%. The discard rate of B&AB remains approximately at 1% throughout. This is a reflection of strategy suggested by CBS aimed at the challenge in maintaining an adequate provincial and national supply of type O and A units, the most common blood types in Canada. It is a suggestion of Canadian Blood Services for the districts to maintain a small stock of type B and AB units to help avoid giving group *compatible* units to recipients who could have had group *specific* red blood cells. This strategy results in a small inventory of type B and AB red blood cell units going unused and ultimately expiring. As a result an approximately 1% outdated discards in B and AB is observed each year since 2008/09.

**Figure 9:**

### RBC Discard Rates in Nova Scotia by ABO



## 6.1 Nova Scotia Discard Rates at the Level of District Health Authority/IWK

The purpose of this section of the report is to show the progress being made at the district level. This is to support accountability and transparency and to provide the districts with the opportunity to identify those that have demonstrated success in inventory management for the purpose of sharing best practices.

Figure 10 shows the total discarded units in District Health Authorities and the IWK for each of the last three fiscal years.

Figure 10

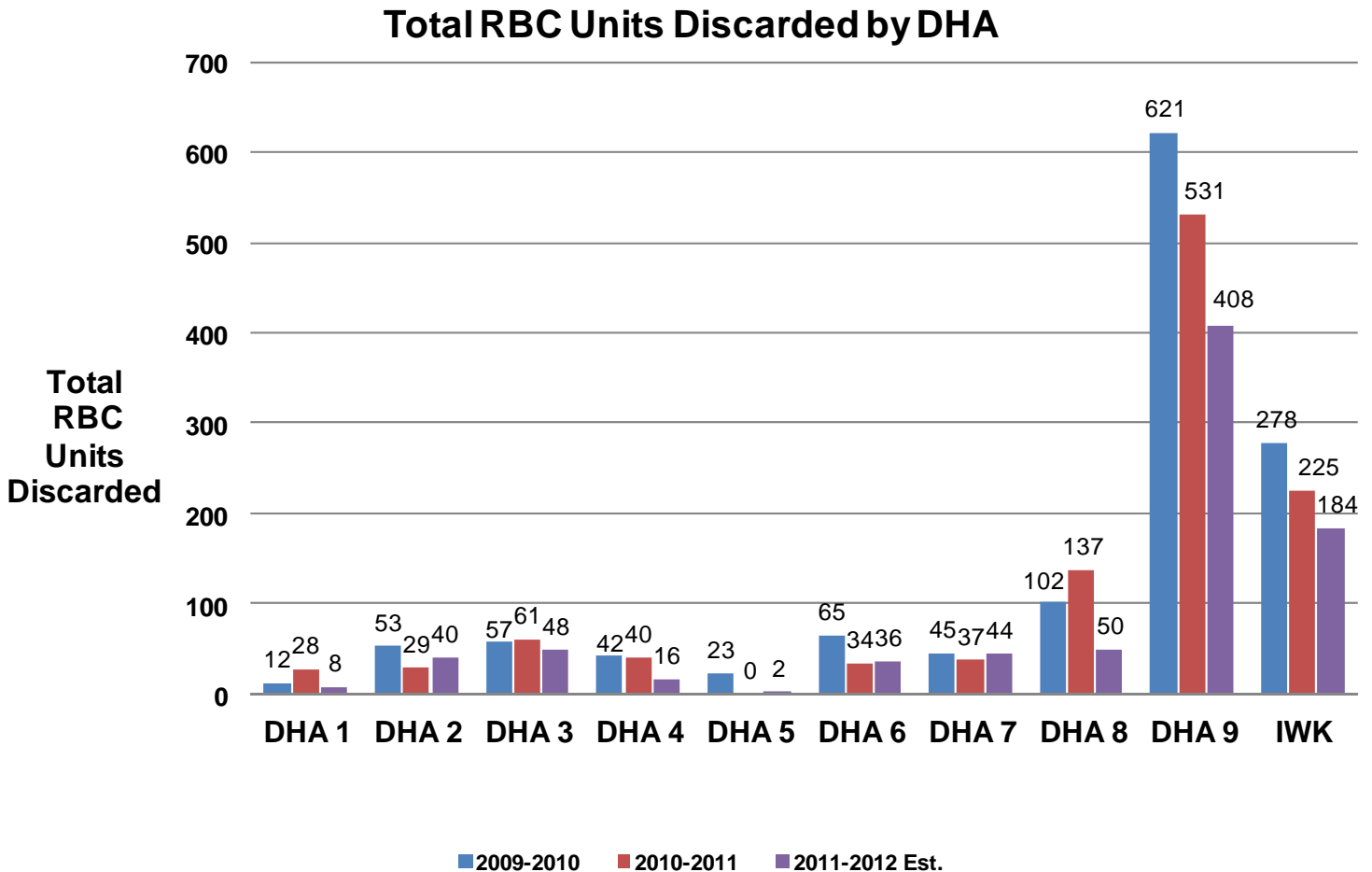




Table 3 shows the discarded units and rates for each District Health Authority/IWK in quarter one and two of fiscal year 2011/12. The table also shows the relative contribution each District makes to the total provincial discards. Note that types B and AB outdate discards are excluded. Capital Health contributes approximately 42% and the IWK contributes approximately 30% to the total discards in Nova Scotia in the second quarter of 2011/12.

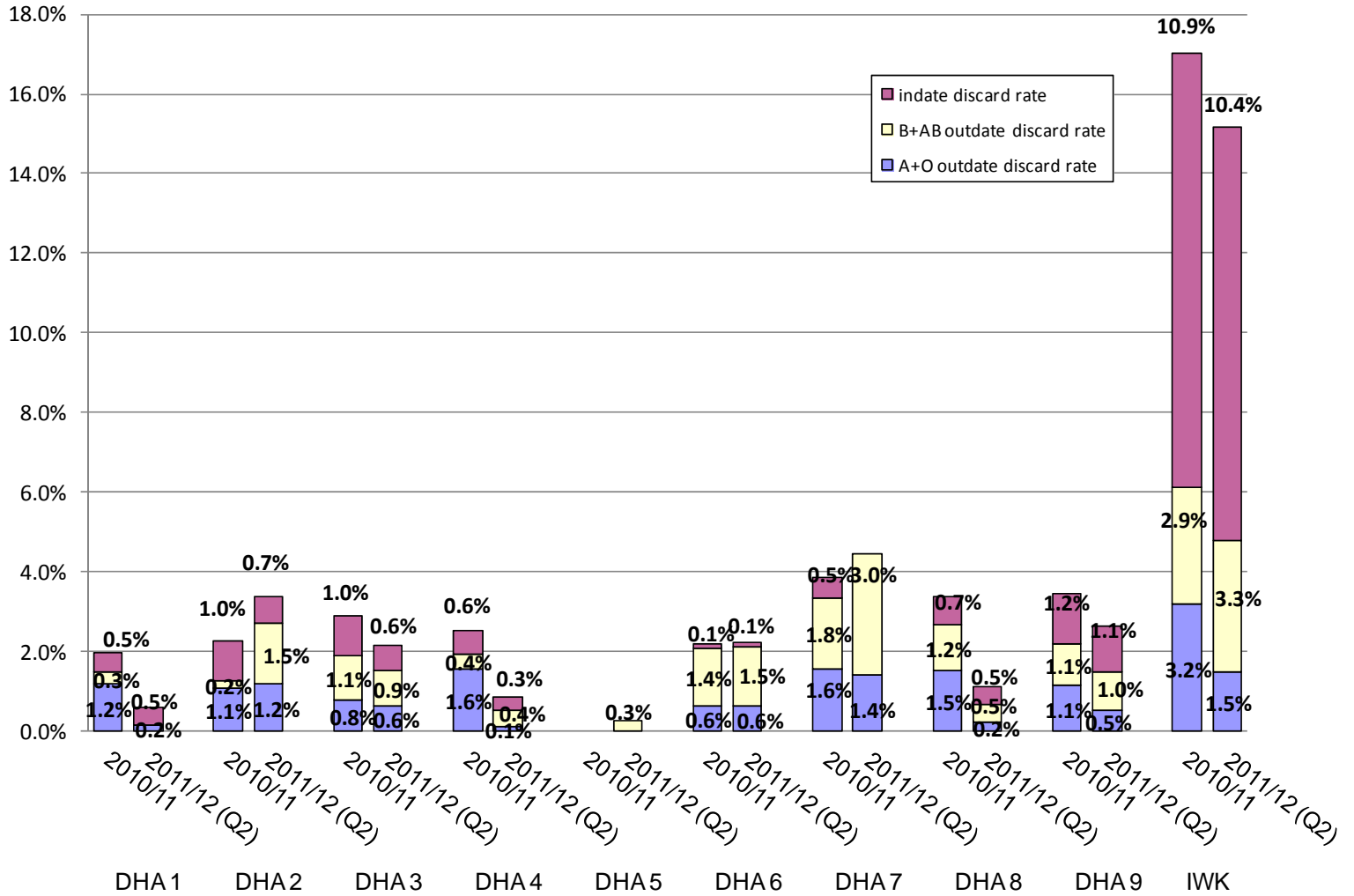
**Table 3**

**Discard Rates and Proportion of Provincial Discards in Each District for Two Recent Quarters**

DHAs & IWK	Q1 2011/12			Q2 2011/12		
	Discarded Units	Discard Rate (%)	% of NS Discards	Discarded Units	Discard Rate (%)	% of NS Discards
<b>1</b>	2	0.62%	1.52%	2	0.60%	1.55%
<b>2</b>	9	3.14%	6.82%	2	0.68%	1.55%
<b>3</b>	3	0.51%	2.27%	11	2.14%	8.53%
<b>4</b>	0	0.00%	0.00%	4	0.95%	3.10%
<b>5</b>	1	0.53%	0.76%	0	0.00%	0.00%
<b>6</b>	4	0.89%	3.03%	2	0.58%	1.55%
<b>7</b>	0	0.00%	0.00%	7	3.32%	5.43%
<b>8</b>	6	0.54%	4.55%	9	0.83%	6.98%
<b>9</b>	73	1.92%	55.30%	54	1.40%	41.86%
<b>IWK</b>	34	11.45%	25.76%	38	13.15%	29.46%
<b>Total</b>	132	1.69%	100.0%	129	1.71%	100.0%

Figure 11 shows the improvement in discard rates of each District Health Authority/IWK over the last two fiscal years. The out date discard is broken down by B & AB outdate discards rate and A & O outdate discards rate.

**Figure 11**



## 6.2 Breakdown of Discards by Blood Type

Table 4 shows a breakdown of the outdate discards by blood type for a one year period. A breakdown of the *indate* discards is *not* shown here because indate blood type counts are not reported.

**Table 4:**

### Breakdown of Outdate Discards by Blood Type for October 2008 to September 2011

District / IWK	AB -	AB +	A -	A +	B -	B +	O -	O +
1	0	4	4	8	3	0	7	9
2	3	1	3	10	10	9	23	14
3	0	37	6	19	6	0	17	19
4	0	1	1	22	0	20	11	24
5	0	0	5	6	0	0	3	2
6	4	34	2	22	16	26	1	4
7	0	0	17	17	24	19	2	11
8	33	30	41	56	21	24	22	12
9	187	158	46	53	104	32	306	59
<b>IWK</b>	3	66	24	29	6	22	27	16

The remainder of this section is comprised of District-level, annual RBC distribution and discard graphs. They are meant to show the progress each District has been making and also to identify those Districts that still may require adjustments to their inventory management practices.

Note that distribution graphs for each District Health Authority is followed by its red blood cell discard graph over the same fiscal years.

Appendix A shows the formulae used to calculate the discard rates in this report. A detailed description of the product types as well as the use types that are used in creating the discard rate graphs can be found in Appendix B.

## Appendix A: Calculation of Discard Rates

The equations below illustrate the methods used to calculate the discard rates in this report.

$$\text{Total Discard Rate} = \frac{\text{indate discarded units} + \text{outdate discarded units}}{\text{indate discarded units} + \text{outdate discarded units} + \text{transfused units}}$$

$$\text{Indate Discard Rate} = \frac{\text{indate discarded units}}{\text{indate discarded units} + \text{outdate discarded units} + \text{transfused units}}$$

$$\text{Outdate Discard Rate} = \frac{\text{outdate discarded units}}{\text{indate discarded units} + \text{outdate discarded units} + \text{transfused units}}$$

## Appendix B: Description of fields for Red Blood Cell Discards

Table B provides a list of both the product types and the use types that are used when calculating discard rates for the figures and tables contained within this report.

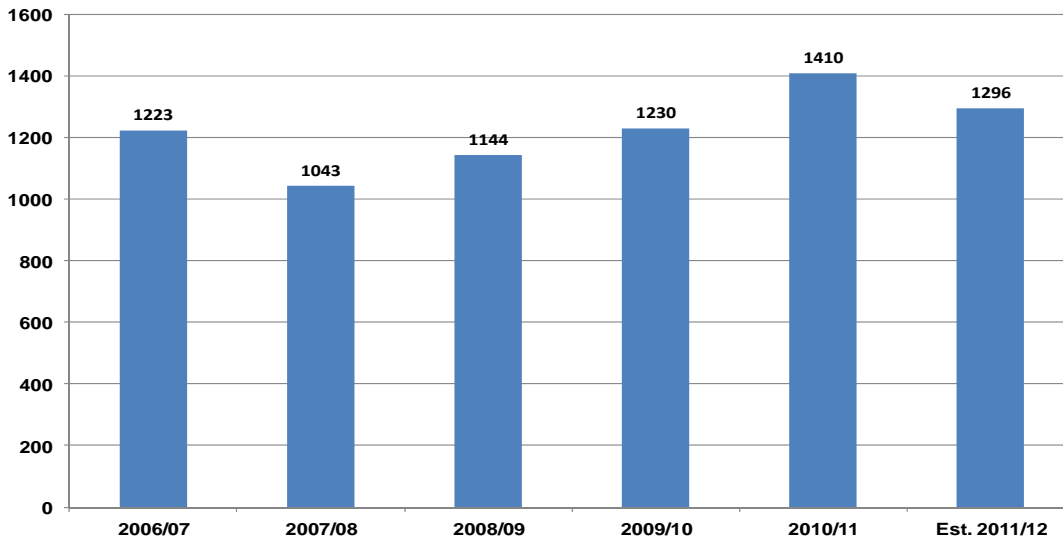
**Table B: Fields Used for the Calculation of Discard Rates in this Report**

Product Type	Use Type			
	Units Discarded – Outdated	Units Discarded- Broken (Indate)	Units Discarded – Other (Indate)	Units Transfused
plain, allogeneic	✓	✓	✓	✓
washed by CBS, allogeneic	✓	✓	✓	✓
deglycerized	✓	✓	✓	✓
autologous	✓	✓	✓	✓
directed	✓	✓	✓	✓
whole blood – autologous	✓	✓	✓	✓
whole blood – directed	✓	✓	✓	✓
whole blood – allogeneic	✓	✓	✓	✓

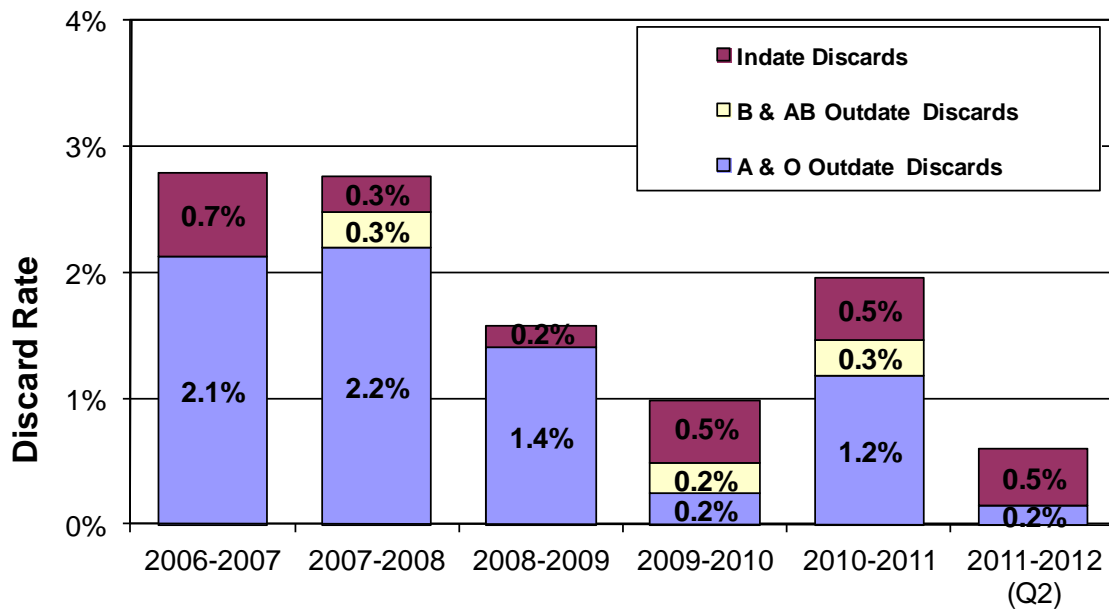
# District Health Authority 1 - South Shore Health

## Annual Red Blood Cell Units Distribution

Figure C1: RBC Units Distributed to DHA 1 by Fiscal Year



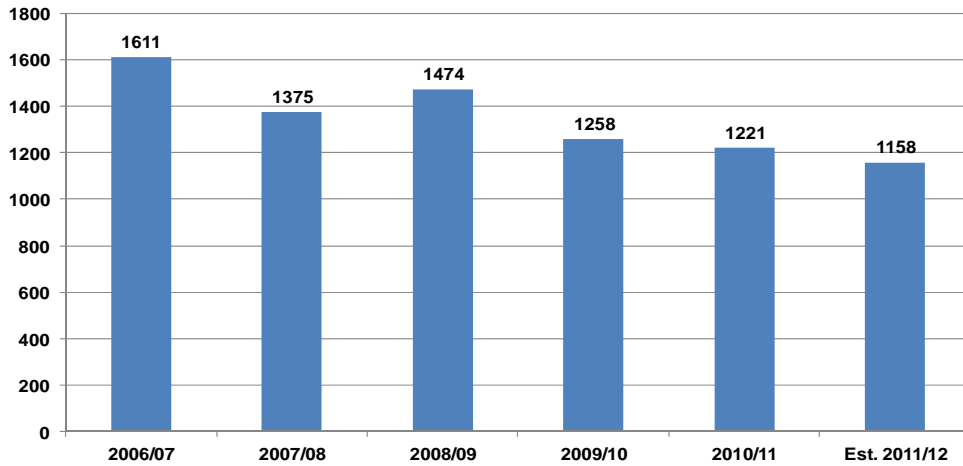
## Annual Red Blood Cell Discard Rates for District 1



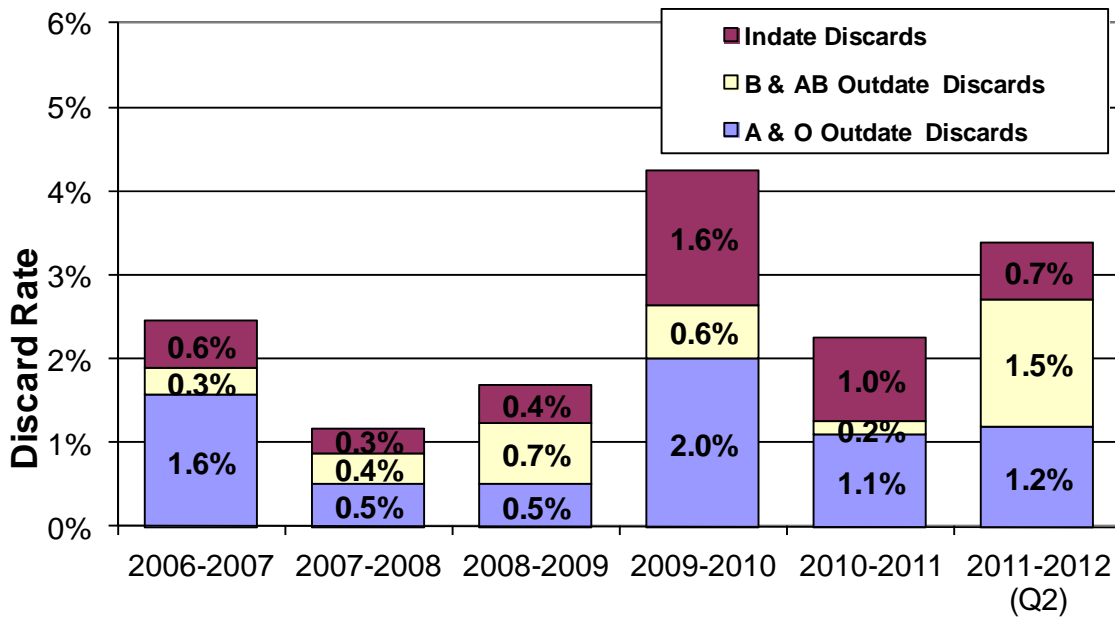
# District Health Authority 2 - South West Nova Health

## Annual Red Blood Cell Units Distribution

Figure C2: RBC Units Distributed to DHA 2 by Fiscal Year



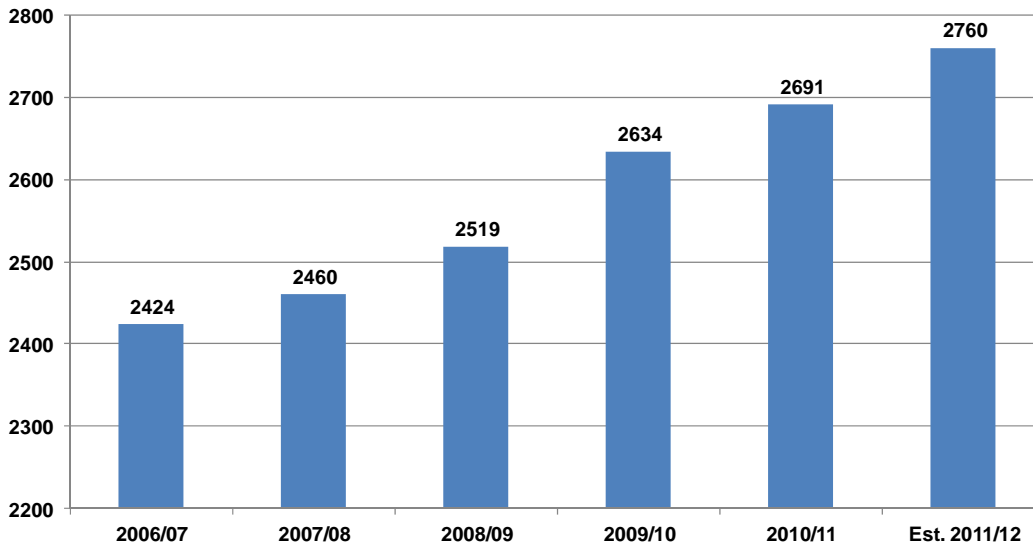
## Annual Red Blood Cell Discard Rates for District 2



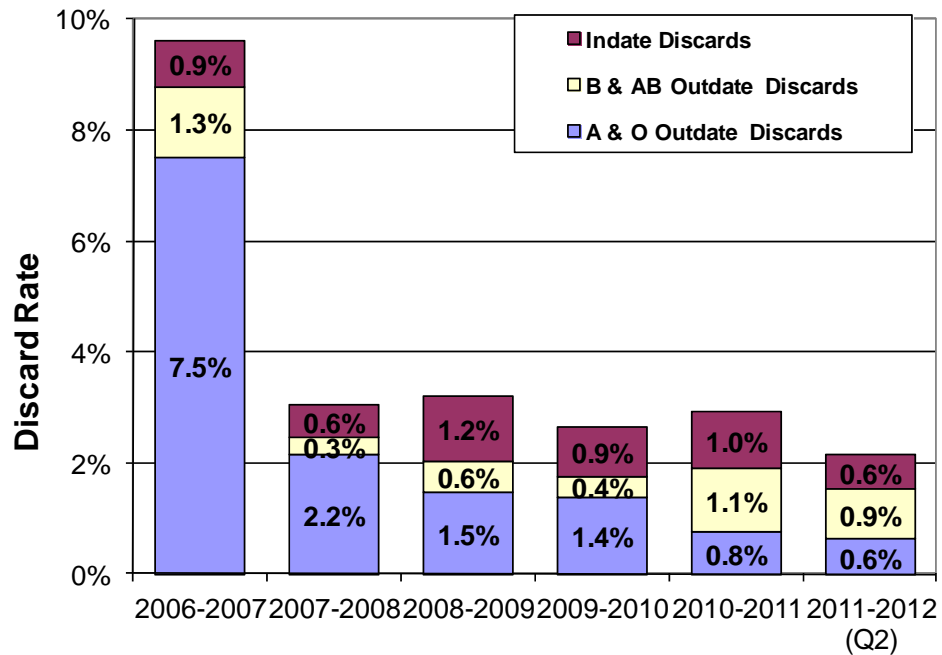
# District Health Authority 3 - Annapolis Valley Health

## Annual Red Blood Cell Units Distribution

Figure C3: RBC Units Distributed to DHA 3 by Fiscal Year



## Annual Discard Rates for District 3

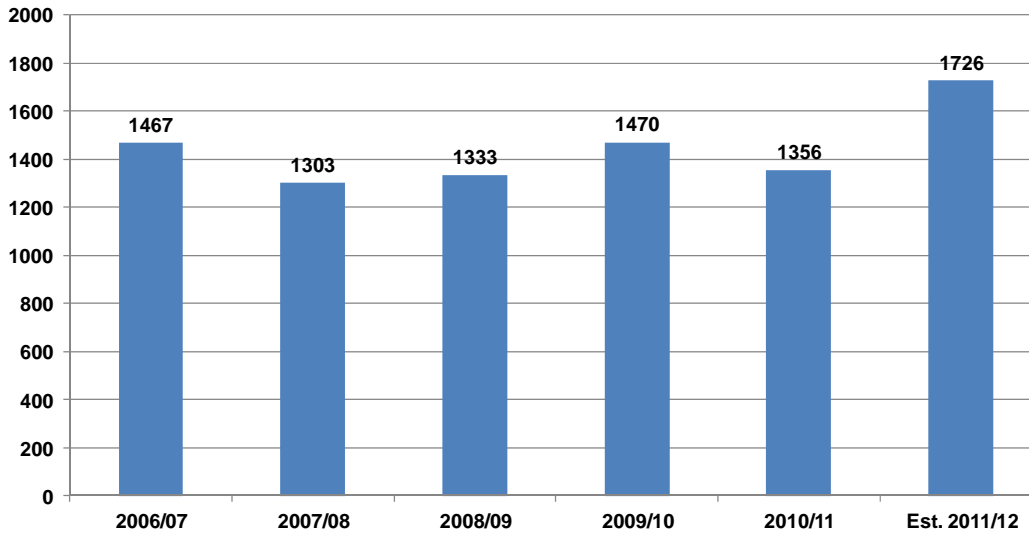




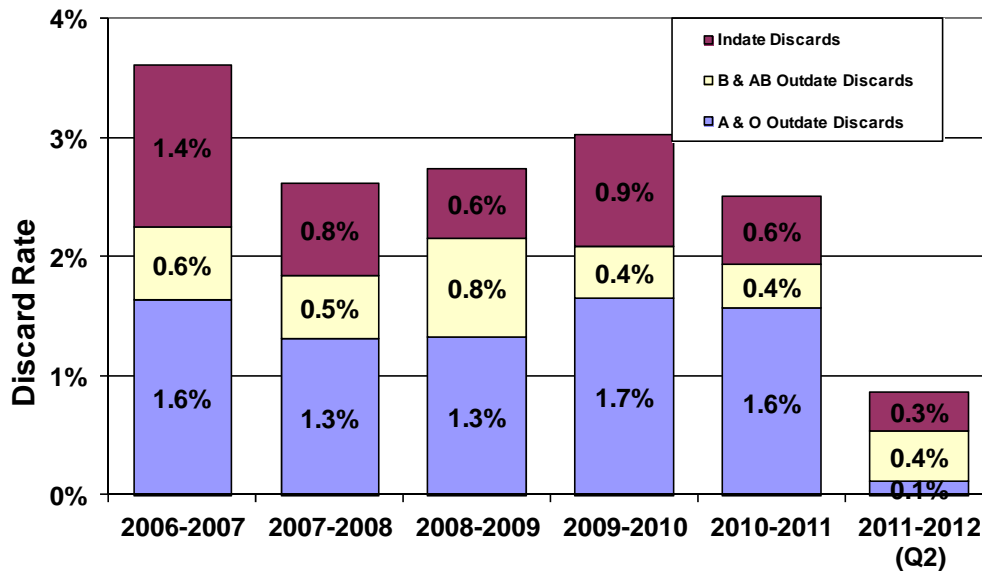
# District Health Authority 4 - Colchester East Hants Health

## Annual Red Blood Cell Units Distribution

Figure C4: RBC Units Distributed to DHA 4 by Fiscal Year



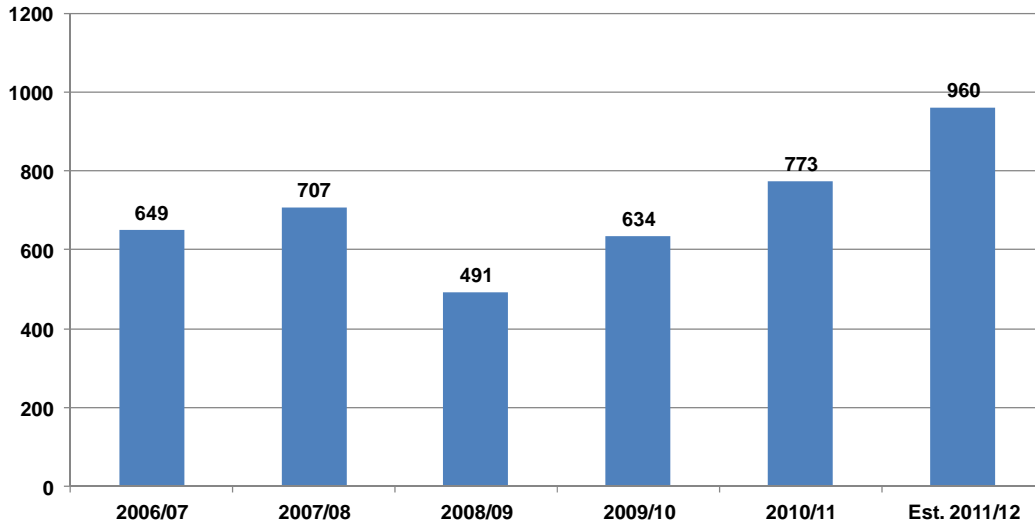
## Annual Discard Rates for District 4



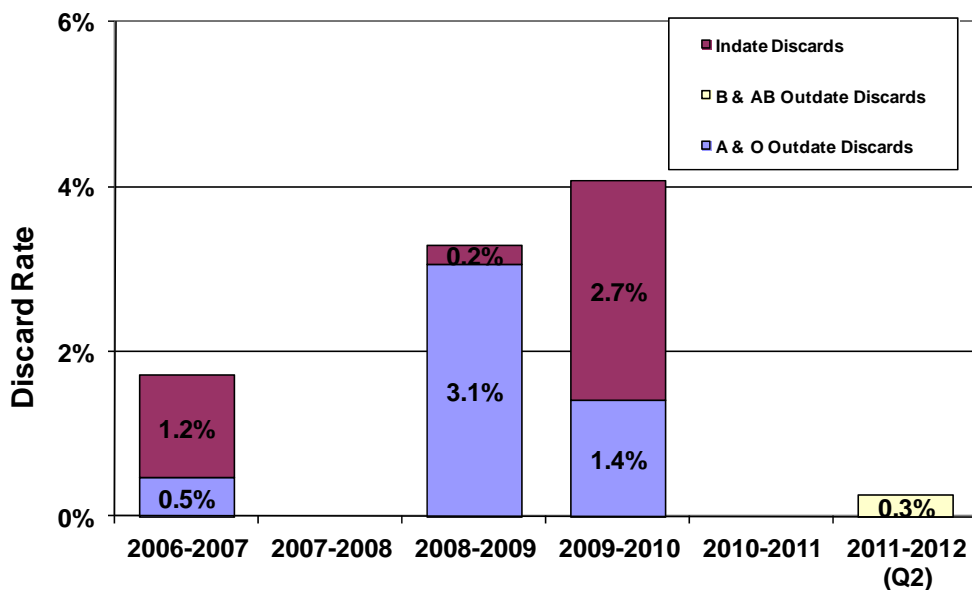
# District Health Authority 5 - Cumberland Health Authority

## Annual Red Blood Cell Units Distribution

Figure C5: RBC Units Distributed to DHA 5 by Fiscal Year



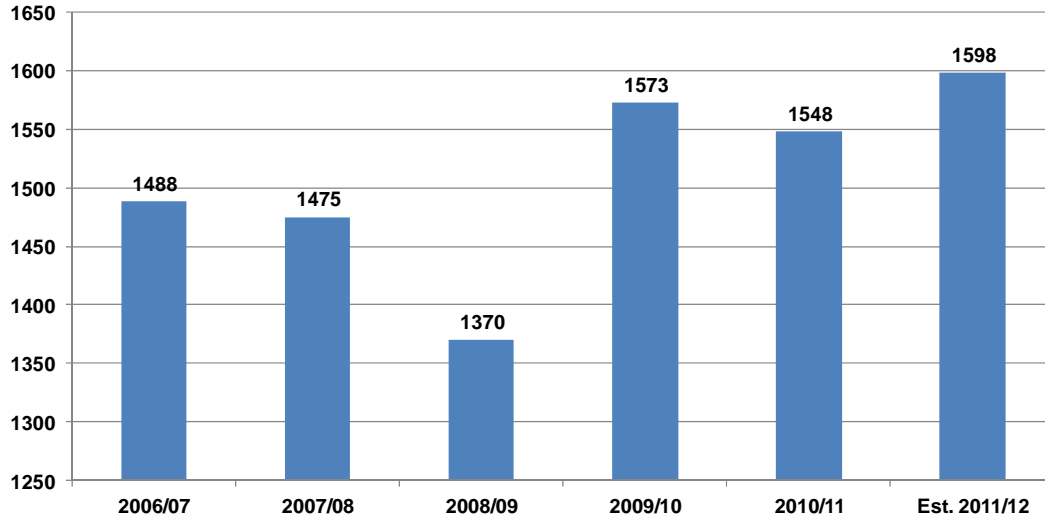
## Annual Discard Rates for District 5



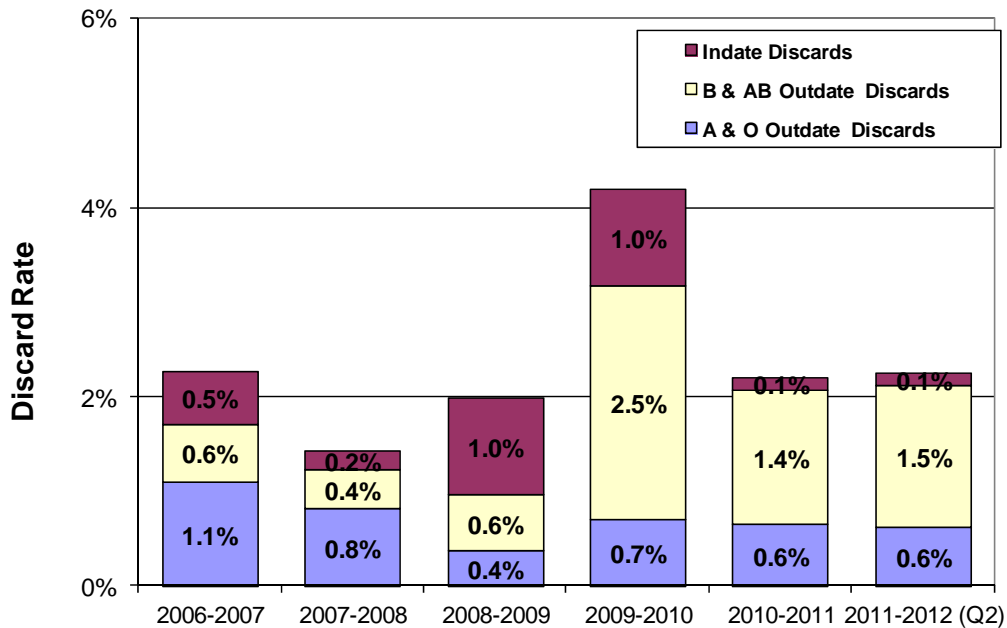
# District Health Authority 6 - Pictou County Health

## Annual Red Blood Cell Units Distribution

Figure C6: RBC Units Distributed to DHA 6 by Fiscal Year



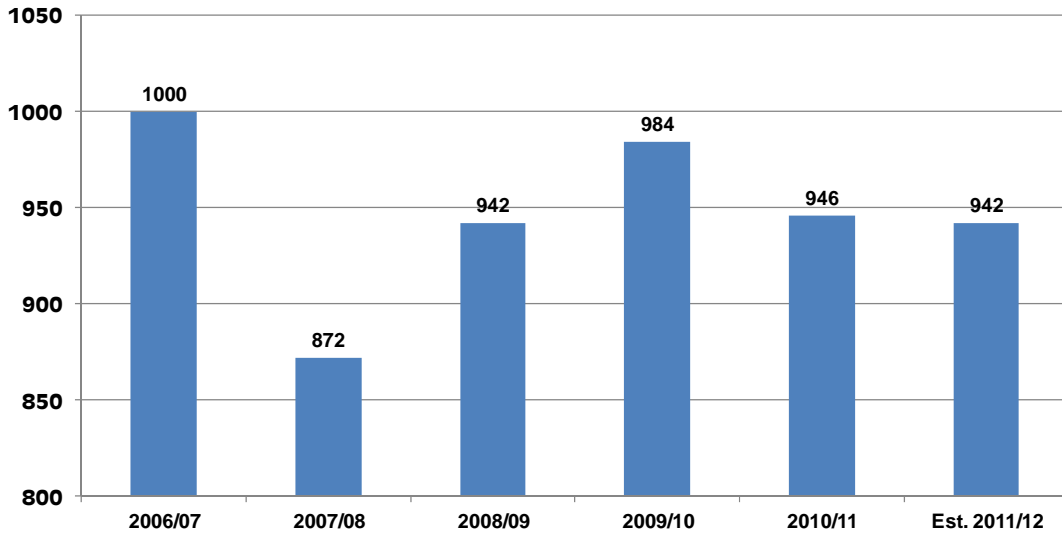
## Annual Discard Rates for District 6



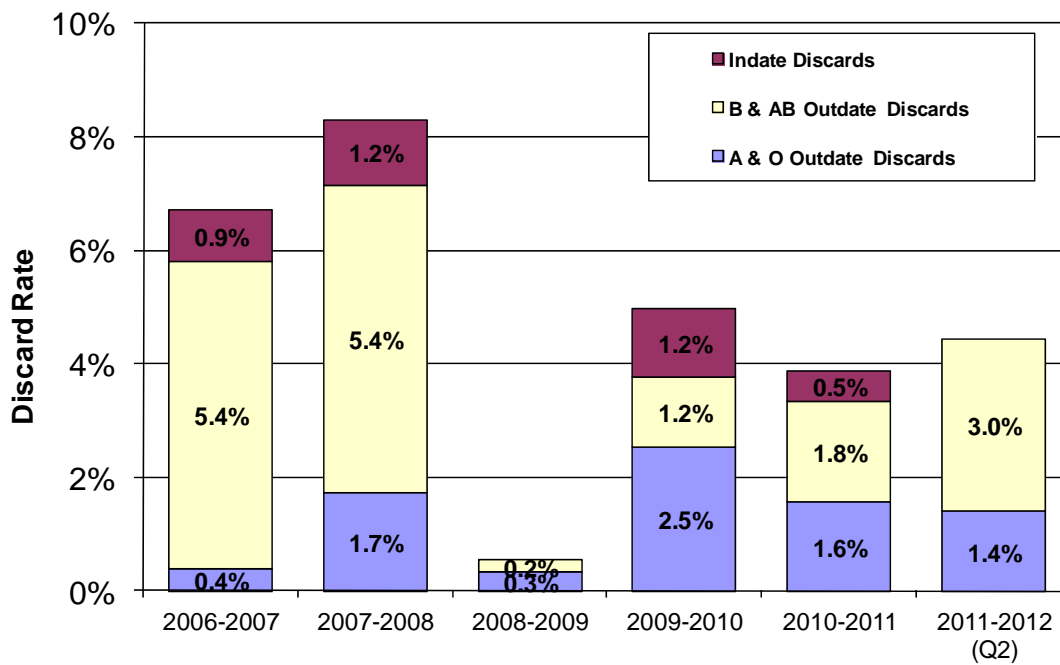
**District Health Authority 7 - Guysborough Antigonish Strait Health Authority**

**Annual Red Blood Cell Units Distribution**

**Figure C7: RBC Units Distributed to DHA 7  
by Fiscal Year**



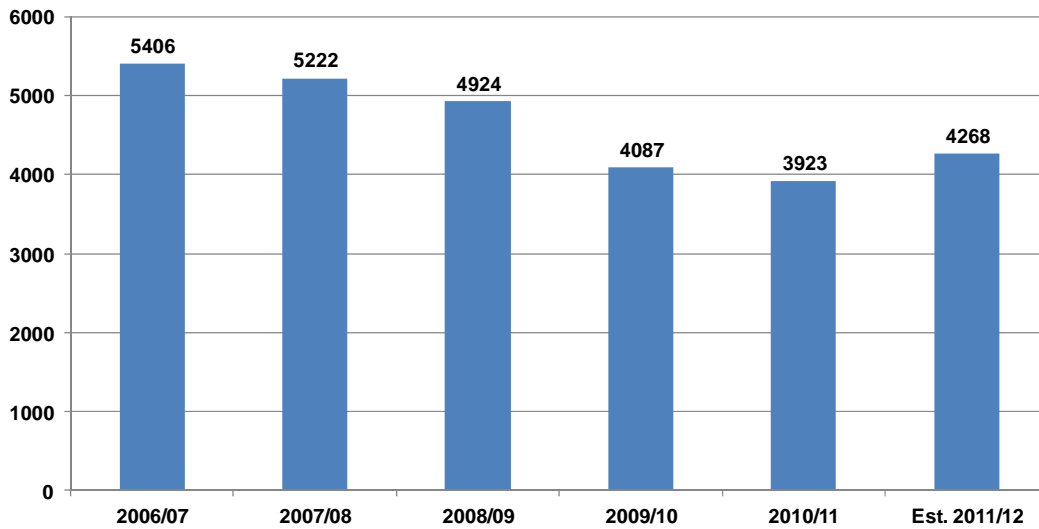
**Annual Discard Rates for District 7**



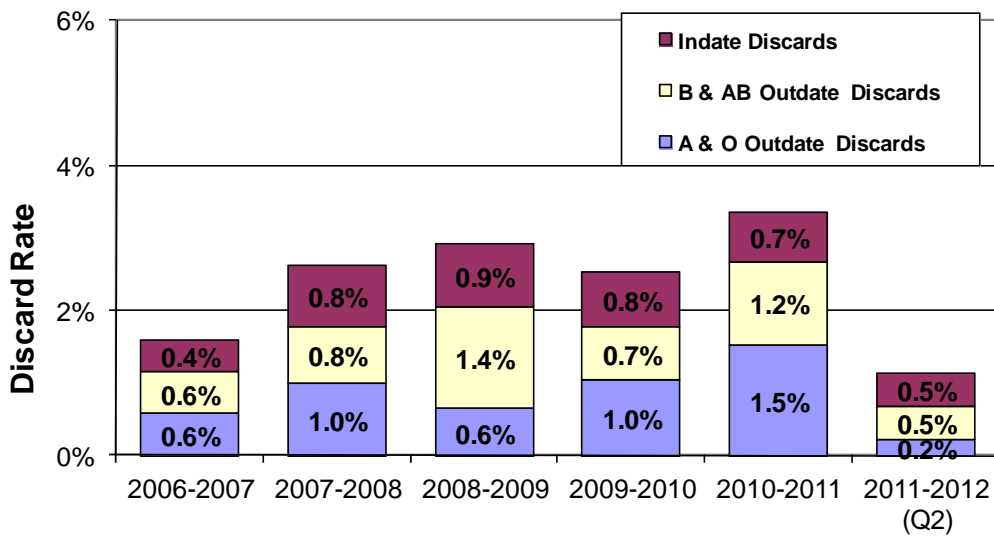
# District Health Authority 8 - Cape Breton District Health Authority

## Annual Red Blood Cell Units Distribution

Figure C8: RBC Units Distributed to DHA 8 by Fiscal Year



## Annual Discard Rates for District 8



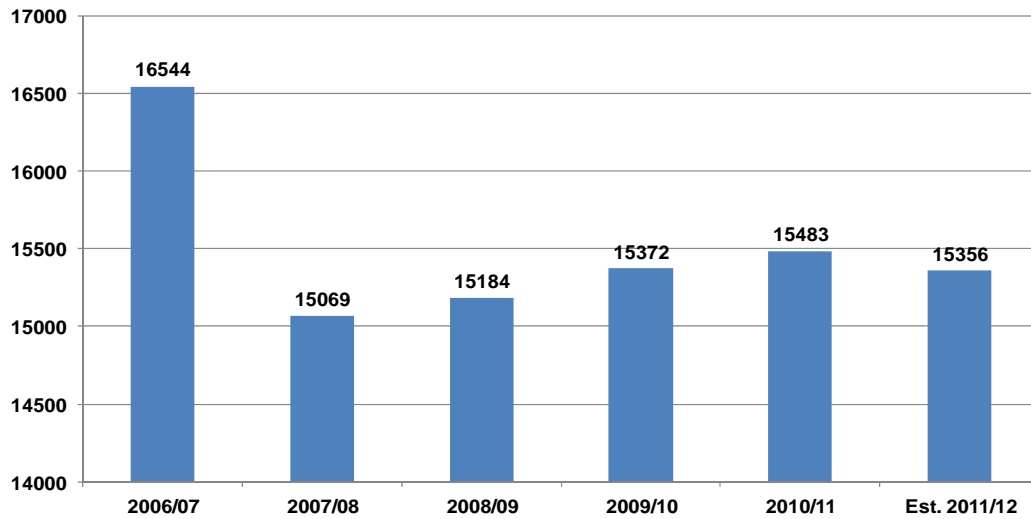
The above figure shows the remarkable improvement in discard rates that have been achieved at Cape Breton District Health Authority. There are several practice changes that have led to these improvements. Cape Breton has had a higher utilization of blood transfused this past year at most of the sites. They have also asked CBS to stagger the dates of blood that is provided. In the past Canadian Blood Services would send (for example) 20 or more units of one blood type that expired on the same date and then, if a large amount of blood was used for a patient and more was requested from CBS, the next 20 units could also have the same expiry date. The staggering of expiry dates has helped considerably in minimizing the discards. DHA 8 orders in small number of units to avoid receiving more units with the same expiration dates.

In 2010/11, DHA 8 lost about 15 units when a blood bag broke in the fridge and contaminated the other units which had to be discarded; such accidents did not happen in 2011/12. The technicians are very diligent when watching expiry dates of blood in stock and try to use the older stock before giving fresher units to patients. Immediate Spin Cross matching helps in reducing discards as excess units are not sitting 'on hand'. There is an excellent inter-site transfer of blood policy. The removal of the operating room refrigerator (prevented discards of units kept at the surgeon's side for more than 30 minutes). The Quality system in the blood transfusion system has improved. Timely discard reporting is done which is followed by discussions and resolution of issues. The whole laboratory works as a team.

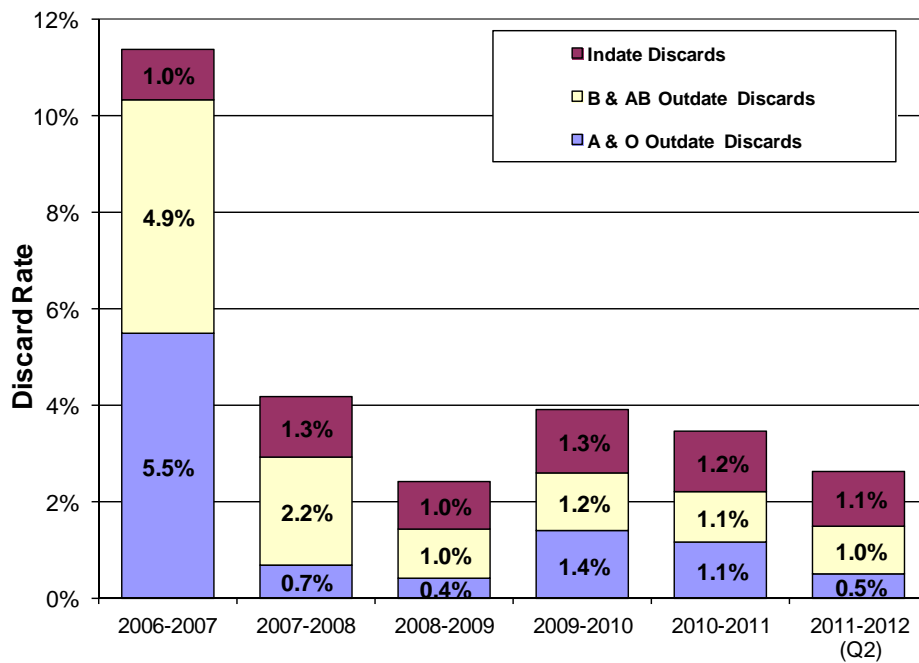
# District Health Authority 9: Capital District Health Authority

## Annual Red Blood Cell Units Distribution

Figure C9: RBC Units Distributed to DHA 9 by Fiscal Year



## Annual Discard Rates for District 9



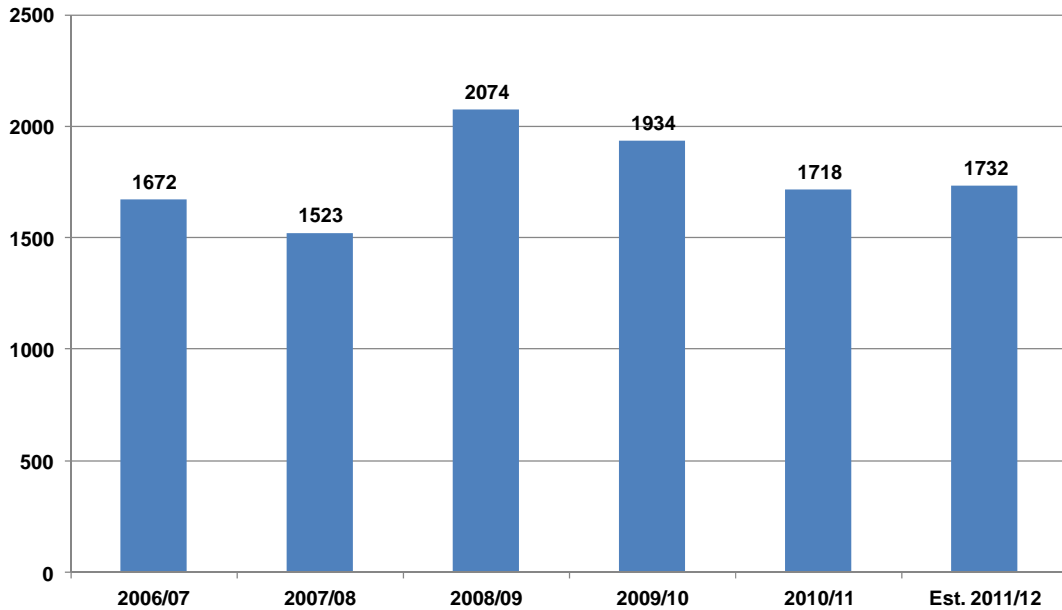
The figure above shows the improvement in discards achieved at CDHA. These were related to several practice changes. Included in those strategies is an analysis of the historical use of red blood cells for elective surgeries which allowed for a reduction in many of the maximum surgical blood orders. A review of transfusion demand based on blood type and day of the week led to a revision of the stock inventory to be more in line with daily needs. Smaller sites within CDHA now only carry a limited inventory with little or no B and AB units, ordering these rare blood types from CBS only when needed for planned transfusions. If they are required more urgently, these units are transferred from the Halifax Infirmary site. The smaller sites within CDHA also transfer units nearing outdate (fourteen days remaining) to the Halifax Infirmary site where they can be used before outdating. As well, moving to electronic cross matching has allowed cross matching on demand which eliminates cross matched units getting closer to expiry while being held. Additionally, blood that is held for surgical cases is now only held for a maximum of 24 hours instead of 48 to 96 hours.



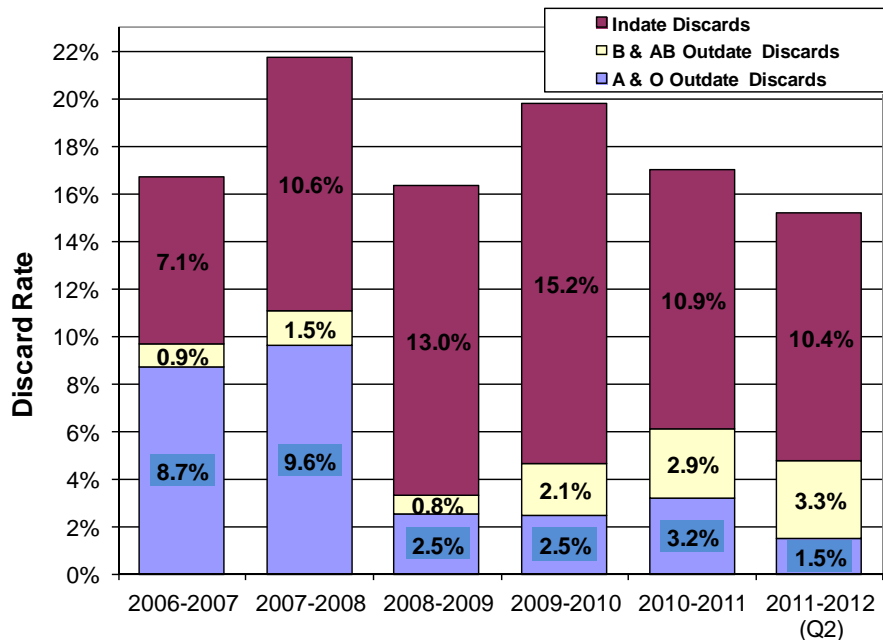
# IWK Health Care Centre

## Annual Red Blood Cell Units Distribution

Figure C10: RBC Units Distributed to IWK by Fiscal Year



## Annual Discard Rates for the IWK Health Centre



In the figure above it can be seen the IWK Health Centre has achieved a very good discard rate for non-B and AB outdate discards (1.5% in 2011/12). The major contributor to their overall discard rate is *indate* discards. Indate discards come primarily from two different sources: plasma-extracted RBC units and temperature requirements not being met for RBC units kept on hand in the OR.

Plasma extraction is the practice of removing the plasma and the anticoagulative/storage solution within it from RBC units. This is to reduce the impact of the high volumes of some of the components of the additive (e.g. adenine, dextrose, mannitol) on recipients with low body weights. The red cells are then resuspended using fresh frozen plasma. Based on published support, cardiac surgeons and blood bank staff at the IWK have agreed plasma extracted RBC units are to be used for young patients (< 1 year) undergoing open heart surgeries where high volume transfusions may be required.

For each open heart surgical case at the IWK (of which there are typically two per week), four units of plasma extracted blood are ordered. Two units are plasma extracted and made available for the procedure, and two units are set aside to be extracted if the need arises. After plasma extraction, a unit of RBCs expires in 24 hours. Wherever possible, to reduce discards, unused plasma-extracted units are used for other patients requiring a transfusion as long as they are a matching blood type; however, after the approximately 8-hour open-heart procedure, only 16 hours are left before expiry and many units still get discarded.

The practice of keeping RBC units on hand in the OR for surgical procedures with the use of coolers has also contributed to indate discards. Inappropriate use of coolers often leads to temperature requirements not being met. To rectify this, the IWK Health Centre has installed two temperature-monitored blood storage fridges; one in the OR and one in the birth unit. This improved the indate discards.