



NATIONAL BLOOD AUTHORITY  
AUSTRALIA

# AUSTRALIAN BLEEDING DISORDERS REGISTRY

Annual Report 2015-16





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Australian Bleeding Disorders Registry (ABDR) Annual Report 2015-16 published by the National Blood Authority.

ISSN 1839-0811 (online version)

This report is available online at <http://www.blood.gov.au/data-analysis-reporting>

Version: 30 April 2017



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# Purpose of this document

The intention of this document is to present the reader with an integrated view of current clinical and demographic information on people with inherited bleeding disorders in Australia and the resultant demand for clotting factor products. It draws on data from the Australian Bleeding Disorders Registry (ABDR) and other National Blood Authority (NBA) supply and contract sources. Some international data comparisons have also, where meaningful, been included.

The Australian Bleeding Disorders Registry (ABDR) is a clinical registry for patients in Australia with bleeding disorders. It is used on a daily basis by clinicians in all Australian Haemophilia Treatment Centres (HTCs) to assist in managing the treatment of people with bleeding disorders and to gain a better understanding of the incidence and prevalence of bleeding disorders. This information will also be used by the NBA to understand demand for, and to facilitate ordering of, clotting factor product.

This document will be used by people involved in providing care for patients with bleeding disorders, and may also be useful for patient advocacy groups and those in administrative and government positions.

# Key findings

The data contained in this reports shows:

- There were 5,947 patients in the Australian Bleeding Disorders Registry (ABDR) in 2015-16
- Of these patients 4,941 were recorded as having common hereditary bleeding disorders
  - 2,301 patients with Haemophilia A (660 patient with severe Haemophilia A)
  - 548 patients with Haemophilia B (102 patients with severe Haemophilia B)
  - 2,092 patients with von Willebrand Disease
- A total of 96 patients were registered as acquired Haemophilia A, Haemophilia B and von Willebrand bleeding disorders
- 1,647 patients received product in 2015-16, 1,022 Haemophilia A patients, 219 Haemophilia B patients, 287 von Willebrand Disease patients and 119 patients with other diagnoses. Of these patients, 22 patients had acquired bleeding disorders
- 156,355,618 IU of Factor VIII products were used by hereditary Haemophilia A patients in 2015-16
  - Prophylactic use by severe Haemophilia A patients accounted for 120,946,825 IU, or 77.4 per cent of the volume issued
- 26,292,500 IU of Factor IX products were used by hereditary Haemophilia B patients in 2015-16
  - Prophylactic use by severe Haemophilia B patients accounted for 16,520,000 IU, or 62.8 per cent of the volume issued
- Demand for Factor VIII products increased by 5.0 per cent when compared to 2014-15 (NBA Annual Report)
  - Recombinant FVIII increased by 5.2 per cent (NBA Annual Report)
  - Plasma derived FVIII decreased by 3.1 per cent (NBA Annual Report)
- Demand for Factor IX decreased by 2.7 per cent compared to 2014-15 (NBA Annual Report)
  - Plasma derived FIX decreased by 61.4 per cent due to a reduction in specific patient requirements
  - Recombinant FIX decreased 8.0 per cent after an increase in 2014-15
- Clotting factors comprise 15 per cent of total blood and blood product issues by cost and by product category in 2015-16



# Background

The information in this section has been drawn from the materials and websites of two peak bodies for haemophilia; the World Federation of Hemophilia ([www.wfh.org](http://www.wfh.org)) and the Haemophilia Foundation of Australia ([www.haemophilia.org.au](http://www.haemophilia.org.au)).

## WHAT ARE BLEEDING DISORDERS?

In people with bleeding disorders, the clotting process doesn't work properly. As a result, people with bleeding disorders can bleed for longer than normal, and some may experience spontaneous bleeding into joints, muscles, or other parts of their bodies.

## BLEEDING DISORDERS ARE INHERITED OR ACQUIRED

Bleeding disorders are almost always inherited or passed through families; they have a genetic basis and the genes responsible for the disorders are passed from parents to children. However, a person can also spontaneously develop a bleeding disorder, although this is rare.

Acquired bleeding disorders are not inherited or passed through families. Most acquired bleeding disorders have an identifiable root cause. Men and women are equally likely to be affected by an acquired bleeding disorder, and the potential for problems is high.

TABLE 1 - MAJOR BLEEDING DISORDERS AND THEIR CAUSE

Disorder group	Cause
Haemophilia A	Deficiency of Factor VIII
Haemophilia B	Deficiency of Factor IX
von Willebrand Disease	Deficiency, or dysfunction, of von Willebrand Factor
Other Factor deficiencies	Deficiency of other coagulation factors
Platelet Disorder	Inherited deficiency of effective platelet function

## HAEMOPHILIA

Haemophilia causes excessive bleeding following trauma or surgery and can be related to spontaneous haemorrhages into muscles and joints. People with haemophilia do not bleed any faster than normal, but they can bleed for a longer time.

Haemophilia is an X-linked disorder that typically affects males, whereas females are normally classified as carriers. However, affected males will pass on the haemophilia gene to their daughters, and women carrying a F8 or F9 gene mutation may have reduced factor levels and should therefore be classified as having haemophilia. Most carriers are asymptomatic. Carriers with clotting factor levels in the haemophilia range may be symptomatic, with bleeding manifestations commensurate with their degree of clotting factor deficiency, particularly during trauma and surgery. Symptomatic carriers are classified as haemophilia in line with the World Federation of Hemophilia ([www.wfh.org](http://www.wfh.org)) guidelines.

## TYPES OF HAEMOPHILIA

- The most common type of haemophilia is called Haemophilia A. This means the person does not have enough clotting Factor VIII (factor eight).
- Haemophilia B is less common. A person with Haemophilia B does not have enough Factor IX (factor nine). The symptoms are the same for people with Haemophilia A and B; that is, they bleed for a longer time than normal.

## HAEMOPHILIA FAST FACTS

- Haemophilia occurs in 1 in 6,000-10,000 males internationally.
- Currently in Australia there are 2,923 people with Haemophilia A and B, (including 74 with Acquired Haemophilia) with varied degrees of severity, in the Australian Bleeding Disorders Registry (ABDR).
- Bleeding is most commonly internal into the joints and/or muscles. Less commonly, bleeding into internal organs can also occur. It can happen without an obvious cause (sometimes called 'spontaneous'), or as a result of injury.
- Over time this internal bleeding into joints ('bleeds') can cause severe arthritis, chronic pain and disability.
- Specialised treatment is needed to help blood clot normally. With appropriate treatment haemophilia can be managed effectively.
- Haemophilia is an inherited condition and occurs in families; however in 1/3 of cases it appears in families with no previous history of the disorder. The haemophilia gene is passed down from parent to child through generations. Men with haemophilia will pass the gene on to their daughters but not their sons. Women who carry the haemophilia gene can pass the haemophilia gene on to their sons and daughters. Sons with the gene will have haemophilia. Some women and girls who carry the gene may also experience bleeding problems.

## VON WILLEBRAND DISORDER/DISEASE (VWD)

von Willebrand disease (VWD) is the most common type of bleeding disorder. People with VWD have a problem with von Willebrand Factor (VWF), a protein in their blood that would normally help control bleeding. When a blood vessel is injured and bleeding occurs, VWF helps cells in the blood, called platelets, adhere to damaged blood vessels and mesh together and form a clot to stop the bleeding. People with VWD do not have enough VWF, or it does not work the way it should. It takes longer for blood to clot and for bleeding to stop.

VWD is generally less severe than other bleeding disorders. Many people with VWD may not know that they have the disorder because their bleeding symptoms are very mild. For most people with VWD, the disorder causes little or no disruption to their lives except when there is a serious injury or need for surgery. However, with all forms of VWD, there can be bleeding problems. VWD is difficult to accurately diagnose as laboratory values can fluctuate and values in those with mild bleeding symptoms can overlap with normal laboratory values.

From some studies, it is estimated that up to 1% of the world's population has VWD, but because many people have only very mild symptoms, only a small number of them are diagnosed. Research has shown that as many as 9 out of 10 people with VWD have not been diagnosed. It is estimated that VWD affects approximately 200,000 people in Australia, but symptomatic individuals possibly less. Currently there are 2,114 people with VWD in the ABDR including 22 with Acquired VWD.

## TYPES OF VWD

There are three main types of VWD. Within each type, the disorder can be mild, moderate, or severe. Bleeding symptoms can be quite variable within each type depending in part on the VWF activity. It is important to know which type of VWD a person has, because treatment is different for each type.

- Type 1 VWD is the most common form. People with Type 1 VWD have lower than normal levels of VWF. Symptoms are usually mild. Still, it is possible for someone with Type 1 VWD to have serious bleeding.
- Type 2 VWD involves a defect in the VWF structure. The VWF protein does not work properly, causing lower than normal VWF activity. There are different Type 2 VWD defects. Severity of symptoms can vary.
- Type 3 VWD is usually the most serious form. People with Type 3 VWD have very little or no VWF. Symptoms are more severe. People with Type 3 VWD can have bleeding into muscles and joints, sometimes without injury.

## RARE CLOTTING FACTOR DEFICIENCIES

Rare clotting factor deficiencies are a group of inherited bleeding disorders caused by a problem with one of several clotting factors. Clotting factors are proteins in the blood that control bleeding. Many different clotting factors work together in a series of chemical reactions to stop bleeding. This is called the clotting process.

Problems with Factor VIII and Factor IX are known as Haemophilia A and B, respectively. Rare clotting factor deficiencies are bleeding disorders in which one of the other clotting factors (i.e. factors I, II, V, V+VIII, VII, X, XI, or XIII) is missing or not working properly. The World Federation of Hemophilia produced a summary Table 26 of the characteristics of rare clotting factor deficiencies, the severity of bleeds associated with them, and the treatment typically required.

## SPECIAL ISSUES FOR GIRLS AND WOMEN

Women with clotting factor deficiencies may have additional symptoms because of menstruation and childbirth. Girls may have especially heavy bleeding when they begin to menstruate. Women with clotting factor deficiencies may have heavier and/or longer menstrual flow, which can cause anemia (with low levels of iron, which results in weakness and fatigue). Women with clotting factor deficiencies should receive genetic counselling about the risks of having an affected child well in advance of any planned pregnancies and should see an obstetrician as soon as they suspect they are pregnant. The obstetrician should work closely with the staff of the haemophilia/bleeding disorder treatment centre in order to provide the best care during pregnancy and childbirth and to minimize the potential complications for both the mother and the newborn child.

Women with certain rare factor deficiencies (such as Factor XIII deficiency and afibrinogenemia) may be at greater risk of miscarriage and placental abruption (a premature separation of the placenta from the uterus that disrupts the flow of blood and oxygen to the fetus). Therefore, these women require treatment throughout the pregnancy to prevent these complications.

The main risk related to pregnancy is postpartum haemorrhage. All bleeding disorders are associated with a greater risk of increased bleeding after delivery. The risk and the severity of the bleeding can be reduced with appropriate treatment. This treatment is different for each woman and depends on her personal and family history of bleeding symptoms, the severity of the factor deficiency, and the mode of delivery (vaginal birth vs. caesarean section). Factor replacement may be necessary in some cases.

## INHERITED PLATELET DISORDERS

Platelets are small parts of cells that circulate in the blood. They are involved in the formation of blood clots and the repair of damaged blood vessels.

When a blood vessel is injured, platelets stick to the damaged area and spread along the surface to stop the bleeding (this process is called adhesion). At the same time, chemical signals are released from small sacks inside the platelets called granules (this process is called secretion). These chemicals

attract other platelets to the site of injury and make them clump together to form what is called a platelet plug (this process is called aggregation).

Sometimes the platelet plug is enough to stop the bleeding. However if the wound is large, other proteins called clotting factors are recruited to the site of injury. These clotting factors work together on the surface of the platelets to form and strengthen the blood clot.

### WHAT ARE PLATELET FUNCTION DISORDERS?

Platelet function disorders are conditions in which platelets don't work the way they should, resulting in a tendency to bleed or bruise. Since the platelet plug does not form properly, bleeding can continue for longer than normal. Since platelets have many roles in blood clotting, platelet function disorders can lead to bleeding disorders of various intensities.

## SEVERITY

Haemophilia A and B are classified according to their severity, as this informs the treatment regimens required. The definitions of severity that are applied within the ABDR are listed in Table 2. Definition of severity of VWD and other coagulation factor deficiencies is not standardised but variable.

TABLE 2 - SEVERITIES AND THE CONCENTRATION OF CLOTTING FACTORS<sup>1</sup>

Severity	Concentration of Clotting Factor	Typical Bleeding Picture
Severe	<0.01 IU/ml (<1% of normal) <sup>†</sup>	Frequent bleeding episodes common, predominantly into joints & muscles. Bleeding can occur spontaneously or after minor injury.
Moderate	0.01 – 0.05 IU/ml (1–5% of normal)	Can bleed after minor injury. May have joint bleeding. Severe bleeding with trauma, surgery, invasive procedures.
Mild	>0.05 – 0.40 IU/ml (5-40% of normal) <sup>‡</sup>	Spontaneous bleeding does not occur. Bleeding with major trauma, surgery, invasive procedures.

Notes † Normal concentration of Factor VIII or IX is defined as 100% or one unit of Factor VIII activity per ml of plasma - 100 U/dL (Kasper, CK 2004, Hereditary plasma clotting factor disorders and their management. Treatment of Hemophilia Monograph Series, No. 4, World Federation of Hemophilia, Montreal, Canada)  
‡ Levels of FVIII above 40% are usually considered sufficient for normal haemostasis

## TREATMENT OF BLEEDING DISORDERS

Mild conditions may require no treatment or treatment only under special circumstances, such as surgery. More severe conditions may require regular interventions. Treatment may occur in hospital or other medical facilities, or at home. The treatments may be regular and preventative (prophylaxis), or on demand (when a bleed occurs). In some patients, therapy is complicated when their body develops inhibitors that destroy the replacement clotting factors and other treatment is necessary.

Often the treatments involve providing replacement for the missing or defective clotting factors. Products used include plasma derived and recombinant clotting factors, cryoprecipitate and Desmopressin (1-desamino-8-D-arginine vasopressin; DDAVP) which can stimulate the release of Factor VIII and VWF from stores in the body (this is not used in Haemophilia B or Factor IX deficiency).

<sup>1</sup> Modified from Srivastava A, Brewer AK, Mauser-Bunschoten EP, Key NS, Kitchen S, Llinas A, Ludlam CA, Mahlangu JN, Mulder K, Poon MC, Street A; Treatment Guidelines Working Group on Behalf of The World Federation Of Hemophilia (2013). Guidelines for the management of haemophilia, Haemophilia 19(1):e1-47.

# Treatment of bleeding disorders in Australia

The majority of people with these conditions are treated at HTC which are specialist centres that provide comprehensive care to people with haemophilia and other bleeding disorders. The comprehensive care model ensures that preventative and general treatment on the complex aspects of haemophilia are given in a co-ordinated way by a multi-disciplinary team with specialised expertise within the one centre.

HTCs were established following a decision by Australian Health Ministers Advisory Council (AHMAC) in 1998, to provide a leadership role within their hospital, city and outlying areas to ensure optimal care and an equitable distribution of professional and therapeutic resources, together with responsible record-keeping. The roles of these Centres are defined in [Appendix B](#). The locations of the HTCs in Australia are shown in Figure 1.



FIGURE 1 - LOCATION OF HAEMOPHILIA TREATMENT CENTRES

The model for HTCs varies between jurisdictions in relation centralisation of services, size and age of patient population.

There are also some patients whose treatment is managed by clinicians who are not associated with a HTC. The proportion of product that is used in these circumstances varies across jurisdictions and there is some variability in the data capture for this activity between jurisdictions. Accordingly, data on total volume of products recorded from the ABDR may not be consistent with data from other sources. A description of the aims and governance of HTCs is provided at [Appendix B](#).

# The Australian Bleeding Disorders Registry (ABDR)

The Australian Bleeding Disorders Registry (ABDR) is a database that is designed to collect all clinical information related to the treatment of people with inherited bleeding disorders. This includes information about patient diagnosis, viral status, treatment details, hospital admissions and administrative information as well as details on ordering, supply and use of clotting factor products. Information is entered into the ABDR web enabled software by staff at HTC's. The current version of the ABDR has been in existence since December 2008 and background on the development of the system is at Appendix D History of the ABDR. In August 2012 the 4<sup>th</sup> generation ABDR was implemented.

The ABDR provides health care teams and support staff with a record enabling them to monitor and manage treatment over time to improve patients' quality of life. De-identified information from the ABDR may be used for research purposes by authorised organisations to understand and improve treatment for bleeding disorders.

Considerations for the release of any information for research are made under specific governance arrangements. The ABDR also provides governments with information on total clotting factor product requirements to inform supply planning to meet the needs of all Australians with bleeding disorders.

The ABDR has evolved and improved with improvements in technology and feedback from stakeholders. In 2014 the ABDR entered a new phase with MyABDR - a secure app for smartphones (Android and iOS) and a web site for people with bleeding disorders or parents/caregivers to record home treatments and bleeds. It is an internet-based online system that gives patients a quick, easy and reliable way to:

- Record treatments and bleeds
- Manage treatment product stock
- Share the information with a Haemophilia Treatment Centre through the Australian Bleeding Disorders Registry (ABDR)
- Update contact and personal details

## ABDR MANAGEMENT AND GOVERNANCE

The ABDR is managed on a day to day basis by the National Blood Authority (NBA) in accordance with the guidance and policy oversight provided by the ABDR Steering Committee. The Committee consists of representatives of the key stakeholders involved in the clinical management, advocacy and funding of treatment for people with bleeding disorders.

### **Endorsement from Haemophilia Foundation Australia**

*Haemophilia Foundation Australia supports the ABDR. It helps doctors and other treating health professionals to understand more about the care and treatment needs of people affected by bleeding disorders. The ABDR will assist and guide planning to ensure treatment product is available when it is needed. We are confident the steps in place will mean accurate, reliable and confidential data is available and that no patient details can be identified outside haemophilia centres.*

[www.haemophilia.org.au](http://www.haemophilia.org.au)

### **Endorsement from Australian Haemophilia Centre Directors' Organisation**

*The ABDR is a valuable tool that provides a summary of those affected with haemophilia and other bleeding disorders in Australia. Data from the ABDR is the best information available for clinicians to advise governments making policy decisions regarding treatment needs and product availability.*

*National statistics available through the ABDR will give AHCCDO an overview of practice and allow opportunities for improvement. This data can be pooled to compare Australian treatment standards with international benchmarks. The ABDR will continue to provide the ability to assess quality of life and other important clinical questions arising across Australia.*

*AHCCDO's partnership on this initiative with the National Blood Authority, Haemophilia Foundation Australia and other specialist health professional groups is vital to the pursuit of excellence in clinical treatment practices.*

[www.ahccdo.org.au](http://www.ahccdo.org.au)

In 2015-16 the Steering Committee representatives were:

- Dr John Rowell (Chair) – Australian Haemophilia Centre Directors' Organisation
- Dr Simon McRae – Chair of Australian Haemophilia Centre Directors' Organisation
- Ms Sharon Caris – Executive Director, The Haemophilia Foundation Australia
- Mr Michael Furey, VIC Health – Jurisdictional Blood Committee nominee
- Mr Ian Kemp – National Blood Authority

## PATIENT PRIVACY IN ABDR AND MYABDR

The ABDR and MyABDR are provided by the National Blood Authority (NBA). The NBA is required to ensure that patient information in ABDR and MyABDR is collected and managed in a way which complies with the Commonwealth *Privacy Act 1988*. There are also parallel requirements which may apply under state and territory laws. Privacy requirements under the *Privacy Act* were tightened in 2014, and a new Privacy Policy for these systems was implemented from 26 January 2015.

More information about the management of patient privacy in ABDR and MyABDR can be found at <http://www.blood.gov.au/privacy-info-abdr-myabdr>, including a copy of the ABDR/MyABDR Privacy Policy together with further information, forms and other implementation resources.

In order to maintain the anonymity of individual patients and health providers, small cell data published or released, showing less than five (5) may be suppressed or aggregated if there is a potential to re-identify or exceptions are agreed between national and state/territory data custodians.

## DATA GOVERNANCE

There is an extremely robust Governance framework that oversees the management and operation of the ABDR. An AHCCDO member chairs the Steering Committee tasked with these responsibilities. The Steering Committee also includes the Executive Director of Haemophilia Foundation Australia to ensure patient needs are met. Patient privacy and confidentiality are paramount to these arrangements.

In addition, there are stringent security protocols embedded into the technical architecture of the ABDR. These effectively control access to personal data ensuring this information is only accessible to treating health professionals and authorised support staff.

The database provides a capability for all HTC staff to enter data on the interactions with patients to provide treating clinicians with a comprehensive picture of the health and wellbeing of patients. The database provides for both real time ordering of product and retrospective collection of data to provide national clotting factor usage data to inform and assist planning and funding. Future development of the system will provide for inclusion of information on physiotherapy and social work interactions with patients.

To ensure appropriate management of the information, the NBA has instigated a detailed governance framework for a data analyst to use a Business Intelligence tool to store and access the de-identified data.

## DATA QUALITY ISSUES

There are a number of data quality issues in the ABDR. These include incomplete records with empty fields or entries. The data entered into some fields has also been characterised by a lack of consistency. This issue in the interpretation of specific fields has been addressed with the development of data standards for users. Application of the data standards will improve data quality. The ABDR Steering Committee has initiated strategies to improve the data quality and over time the reporting

from the ABDR has become more robust. However, there are still some data quality issues that impact the data presented in this report and review of these issues continues to be addressed.

### **ABDR SYSTEM**

The 4th Generation ABDR was successfully implemented on 13 August 2012. System enhancements are ongoing and approved by the ABDR Steering Group to enhance performance and ease of use.

### **COMPARING DATA FROM PREVIOUS ABDR ANNUAL REPORTS**

Comprehensive automated and manual data cleansing and validation processes (that occurred as part of the implementation of the new system) enhanced the ABDR data accuracy and consistency presented in this report. This will make it difficult to undertake comparisons with data published in previous reports particularly in regards to multiple diagnoses, treatment plans, ages and dates of death. In 2014-15 historical data was refreshed for the four previous years. Continued work on the data integrity of the registry has been undertaken in 2015-16.

### **CONSISTENT APPLICATION OF DIAGNOSES AND DEFINITIONS**

The application of definitions for bleeding disorders (e.g. VWD subtypes) varies between HTC's, and work will continue to ensure consistent approaches are used, including alignment of the severity ratings and treatment regimens for some patient records.

Commencing 2014-15 the data has been categorised by hereditary and acquired.

### **VON WILLEBRAND DISEASE**

Not all patients with VWD are treated through HTC's and the figures in this report do not represent the total number of VWD patients in Australia.

The diagnosis of VWD subtypes and the assignment of a severity rating to the disorder can vary between HTC's. Often the treatments for VWD involve providing replacement for the missing or defective clotting factors, and use of these products is included in this report.

### **TREATMENTS NOT INCLUDED IN THE ABDR**

The treatments for bleeding disorders often involve providing replacement for the missing or defective clotting factors. The use of commercially produced clotting factors is the subject of this report.

However, there are other clinically appropriate treatments for bleeding disorders which are not counted in this report. Other products used include cryoprecipitate (a fresh blood product), platelets (a fresh blood product) and Desmopressin (1-desamino-8-D-arginine vasopressin, abbreviated as DDAVP).

Mild cases of HMA, HMB and VWD are often treated with DDAVP. Platelet disorders may be treated with DDAVP, platelet infusion or FVIIa.

### **CONSENT**

Patient information in the Australian Bleeding Disorders Registry (ABDR) and MyABDR is collected and managed in a way which complies with the Commonwealth *Privacy Act 1988* and parallel requirements under state and territory laws. Privacy requirements under the *Privacy Act* were tightened in 2014, and a new ABDR/MyABDR Privacy Policy applies from 26 January 2015.

A patient's personal information may be entered into the ABDR, either at a Haemophilia Treatment Centre (HTC) or when a patient enters data directly via MyABDR, and becomes part of an electronic record about the patient's bleeding disorder condition.

In accordance with the ABDR/MyABDR Privacy Policy ([Privacy](#)), a patient's consent is required for the recording of their data in ABDR (consent may be given by a parent, guardian or authorised representative where relevant). Where a patient does not consent then details will not be aggregated in this report, and therefore patient numbers and product use may be understated.



# Supply of products for treatment

A key element in ensuring security of supply of products for the treatment of bleeding disorders is the NBA's role in developing, coordinating and monitoring the annual national supply plan and budget, including obtaining annual approval from health ministers. Further details on national supply and demand trends can be found in [Appendix C](#).

The range of products available to clinicians has changed over the years. Figure 2 shows the total issues and market shares for recombinant products from 2011-12 to 2015-16.

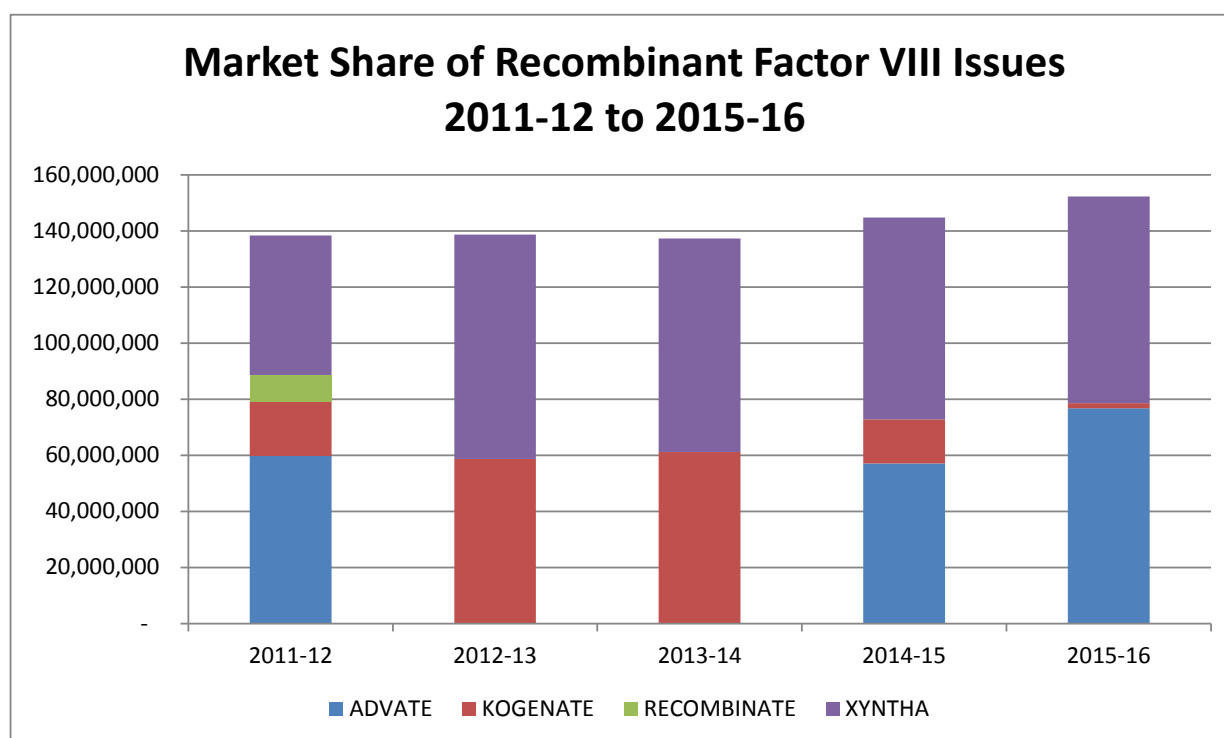


FIGURE 2 - MARKET SHARE OF RECOMBINANT FVIII ISSUES 2011-12 TO 2015-16

Figure 2 illustrates the changes that occurred during 2011 to 2013, brought about by new national supply arrangements, with a transition away from Advate and Recombinate, an increase in the issue of Xyntha and the introduction of Kogenate. In 2014-15 the NBA implemented new contracts for the supply of Recombinant Factor VIII and IX. The new supply arrangements have provided high level national efficiencies without detriment to the patient population. Advate accounted for approximately 50 per cent and Xyntha for nearly 48 per cent of the market share of Recombinant FVIII issues.

The most challenging aspect of HMA management is the development of FVIII inhibitors; previously untreated patients are at the highest risk for inhibitor formation.

Patient participation in company clinical trials for Extended Half Life recombinant Factor VIII and Factor IX products continues to contribute to the variability of year-to-year product growth.

# ABDR patient demographics

This section of the report presents the key patient demographic data collected in the ABDR.

## DIAGNOSES

The following tables present the numbers of patients in the ABDR and the numbers of patients who received therapeutic products during the years 2011-12 to 2015-16. As noted in the section on *Data quality issues* (page 15) comprehensive automated and manual data cleansing and validation processes that occurred as part of the 4th Generation ABDR Redevelopment project released in August 2012 and the continuation in 2015-16 enhanced the ABDR data accuracy and consistency presented in this report. This may make it difficult to undertake comparisons with data published in previous reports.

Table 3 lists the number of people in the registry and the number treated by latest broad diagnosis for the years 2011-12 to 2015-16. Table 5 expands the data in Table 3 to show the number of people in the registry and the number treated by detailed diagnosis for the years 2011-12 to 2015-16.

TABLE 3 - NUMBER OF PEOPLE IN THE REGISTRY AND TREATED BY BROAD DIAGNOSIS

Diagnosis	Number in ABDR Registry*					Number who Received Product during the year				
	2011-12	2012-13	2013-14	2014-15	2015-16	2011-12	2012-13	2013-14	2014-15	2015-16
<b>Hereditary</b>										
HMA	2,017	2,091	2,155	2,158	2,301	921	984	964	992	1,022
HMB	501	517	532	530	548	194	206	205	218	219
VWD	1,842	1,921	2,013	2,012	2,092	193	222	249	255	287
<b>Acquired</b>										
HMA	44	40	49	59	74	9	10	9	23	13
HMB										<5
VWD	11	13	18	19	22	<5	5	5	<5	8
<b>Other Diagnoses</b>										
Other‡	207	191	201	193	179	11	7	13	11	15
Other Factor Deficiency	276	295	328	344	391	33	36	46	36	52
Platelet Disorder	186	225	245	255	271	6	15	18	15	19
Vascular	7	7	7	7	7					
Fibrinogen Disorder	27	34	41	49	62	6	8	7	10	11
<b>Total</b>	<b>5,118</b>	<b>5,334</b>	<b>5,589</b>	<b>5,626</b>	<b>5,947</b>	<b>1,374</b>	<b>1,493</b>	<b>1,516</b>	<b>1,563</b>	<b>1,647</b>

Note: Includes asymptomatic carriers in Hereditary

\* As noted in the section *Data quality issues* (p15) the data has improved since previous ABDR Annual Reports. The figures presented here represent the most accurate data currently available. The census date for number of people in the registry is 30 June, the last day of the financial year.

‡The ABDR allows for a diagnosis of 'Other' to be recorded for patients with rare and less prevalent disorders or difficult to classify disorders eg mild VWD

## PATIENTS WITH MULTIPLE BLEEDING DISORDERS

Individual patients may have more than one bleeding disorder, and will be registered with more than one diagnosis. There are patients with multiple diagnoses in the registry for 2015-16. In these cases, a patient may be counted more than once in the data in this report (e.g. if a patient has two bleeding disorders, that patient may be counted in the totals for each disorder).

In 2015-16 there were 93 patients with two diagnoses and 2 patients with three diagnoses. Patients with two diagnoses reported in 2014-15 were 85. Of the patients with more than one diagnosis 16 patients received product.

TABLE 4 - NUMBER OF PEOPLE IN THE REGISTRY WITH MULTIPLE BLEEDING DISORDERS

Diagnosis	Patients Numbers in ABDR Registry*			Number of Patient with Multiple Disorders who Received Product during the year
	Bleeding Disorder 1	Bleeding Disorder 2	Bleeding Disorder 3	
HMA <sup>†</sup>	2,375	43	<5	10
HMB <sup>†</sup>	548	<5		<5
VWD	2,114	17	<5	<5
Other	179	<5		
Other Factor Deficiency	391	19		<5
Platelet Disorder	271	9		
Vascular	7			
Fibrinogen Disorders	62			
<b>Total</b>	<b>5,947</b>	<b>93</b>	<b>&lt;5</b>	<b>16</b>

Note: Includes Acquired and Hereditary disorders

\* As noted in the section *Data quality issues* (p15) the data has improved since previous ABDR Annual Reports. The figures presented here represent the most accurate data currently available. The census date for number of people in the registry is 30 June, the last day of the financial year.

†The ABDR allows for a diagnosis of 'Other' to be recorded for patients with rare and less prevalent disorders or difficult to classify disorders eg mild VWD

TABLE 5 - NUMBER OF PEOPLE IN THE REGISTRY AND TREATED BY DETAILED DIAGNOSIS

	Number in ABDR Registry*					Number who Received Product during the year				
	2011-12	2012-13	2013-14	2014-15	2015-16	2011-12	2012-13	2013-14	2014-15	2015-16
<b>Hereditary</b>										
<b>HMA</b>										
Asymptomatic Carrier Factor VIII Deficiency (HmA)	197	218	241	190	226	<5	7	<5	6	<5
Factor VIII Deficiency (HmA)	1,680	1,723	1,752	1,793	1,972	903	962	942	972	1011
Symptomatic Carrier Factor VIII Deficiency (HmA)	140	150	162	175	103	16	15	18	14	9
<b>HMB</b>										
Asymptomatic Carrier Factor IX Deficiency (HmB)	48	49	54	47	47	<5				<5
Factor IX Deficiency (HmB)	407	418	424	426	471	185	197	199	209	213
Symptomatic Carrier Factor IX Deficiency (HmB)	46	50	54	57	30	8	9	6	9	5
<b>VWD<sup>†</sup></b>										
von Willebrand Disease – Uncharacterised	342	313	318	279	219	13	10	14	13	8
von Willebrand Disease Type 1	1,101	1,175	1,236	1,233	1,328	88	113	130	127	137
von Willebrand Disease Type 2	360	392	417	459	502	65	69	73	84	108
von Willebrand Disease Type 3	39	41	42	41	43	27	30	32	31	34
<b>Hereditary Total</b>	<b>4,361</b>	<b>4,530</b>	<b>4,701</b>	<b>4,700</b>	<b>4,941</b>	<b>1308</b>	<b>1412</b>	<b>1418</b>	<b>1465</b>	<b>1528</b>
<b>Acquired</b>										
HMA	44	40	49	59	74	9	10	9	23	13
HMB										<5
VWD <sup>†</sup>	11	13	18	19	22	<5	5	5	<5	8
<b>Acquired Total</b>	<b>54</b>	<b>52</b>	<b>66</b>	<b>78</b>	<b>96</b>	<b>10</b>	<b>15</b>	<b>14</b>	<b>26</b>	<b>22</b>
<b>Other Factor Deficiency</b>										
Factor V Deficiency	11	11	10	11	17	<5	<5	<5	<5	<5
Factor VII Deficiency	52	53	54	61	67	6	10	9	8	7

	Number in ABDR Registry*					Number who Received Product during the year				
	2011-12	2012-13	2013-14	2014-15	2015-16	2011-12	2012-13	2013-14	2014-15	2015-16
Factor X Deficiency	13	17	17	17	20	<5	5	<5	5	<5
Factor XI Deficiency	162	178	206	217	249	8	12	20	14	24
Factor XII Deficiency†	18	20	16	17	17		<5	<5	<5	<5
Factor XIII Deficiency	15	15	18	19	21	9	9	10	6	11
<b>Platelet Disorder</b>										
Platelet - Bernard-Soulier	<5	5	5	5	5					<5
Platelet - Glanzmann's Thrombasthenia	13	16	17	18	21	<5	<5	<5	<5	8
Platelet - Macrothrombocytopenias		10	10	12	13		<5			
Platelet - May Hegglin	<5	<5	<5	<5	<5		<5			<5
Platelet - Primary Secretion Defect	5	7	9	10	10	<5	<5	<5	<5	
Platelet - Storage Pool (Dense Granule) Deficiency	29	31	37	43	46	<5	<5	<5		<5
Platelet – Uncharacterised	133	153	164	164	173	<5	8	10	10	7
<b>Vascular</b>										
Vascular Disorders - Ehlers Danlos Syndrome	7	7	7	7	7					
<b>Fibrinogen</b>										
Fibrinogen – Afibrinogenemia	6	6	7	7	7	<5	<5	5	5	<5
Fibrinogen – Dysfibrinogenemia	15	22	24	29	36	<5	<5	<5	<5	<5
Fibrinogen – Hypofibrinogenemia	5	5	9	12	17				<5	<5
Fibrinogen Dysfunction - Uncharacterised	<5	<5	<5	<5	<5					
<b>Other (Including Unclassified)</b>	207	191	201	193	179	11	7	13	11	15
<b>Other Diagnoses Total</b>	<b>703</b>	<b>752</b>	<b>822</b>	<b>848</b>	<b>910</b>	<b>56</b>	<b>67</b>	<b>84</b>	<b>72</b>	<b>97</b>
<b>Total</b>	<b>5,118</b>	<b>5,334</b>	<b>5,589</b>	<b>5,626</b>	<b>5,947</b>	<b>1,374</b>	<b>1,494</b>	<b>1,516</b>	<b>1,563</b>	<b>1,647</b>

\* As noted in the section *Data quality issues* (p15) the data has been improved since previous ABDR Annual Reports. The figures presented here represent the most accurate data currently available. The census date for number of people in the registry is 30 June, the last day of the financial year.

†Factor XII Deficiency does not require treatment with products, but is included as a diagnostic category.

## AGE, DIAGNOSIS AND SEVERITY

In the following tables patients are categorised as either Adult (aged 18 years and over) or Paediatric and Adolescent (aged under 18 years) patients.<sup>2</sup>

Table 6 -and Table 7 detail the numbers of patients in the registry who received product (therapeutic treatment) during the period 2011-12 to 2015-16; by broad diagnosis and by severity.

Table 8 and Table 9 set out age group and detailed diagnosis for patients with HMA, HMB and VWD.

The majority of patients receiving treatment for bleeding disorders have HMA, specifically those patients with severe HMA.

There are some discrepancies in the data regarding the coding of severity when a patient receives treatment, and data cleansing and patient record updates are continuing. This will improve the forecasting for the national supply plan and budget for future years. It should be noted that the national forecasting and supply management process continue to perform very well.

Whilst the data discrepancies affect the analysis for this annual report, there is minimal impact on patient care as Haemophilia Treatment Centre staff have full access to their patient records for the provision of care and treatment.

In 2015-16 the results show variations. The patterns indicate that the implemented strategies are improving data quality, completeness and accuracy. This will make it difficult to undertake comparisons with data published in previous reports particularly in regards to multiple diagnoses. Continued work on the data integrity of the registry has been undertaken again in 2015-16.

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<sup>2</sup> In ABDR Annual Reports prior to 2011-12 the threshold age between paediatric and adult patients was 20 years of age. This threshold has been adjusted in the present report to better reflect the manner in which patients are treated in HTCs.

TABLE 6 - NUMBER OF ADULT PATIENTS IN THE REGISTRY AND TREATED BY BROAD DIAGNOSIS AND SEVERITY FOR HMA, HMB

Adult (aged 18 years and over)	Number in ABDR Registry*					Number who Received Product during the year				
	2011-12	2012-13	2013-14	2014-15	2015-16	2011-12	2012-13	2013-14	2014-15	2015-16
<b>Hereditary</b>										
<b>HMA</b>										
Mild	903	939	961	996	1,040	194	220	205	208	227
Moderate	146	151	148	145	159	82	85	78	94	99
Severe	338	348	364	374	385	301	316	327	327	340
<b>HMB</b>										
Mild	219	229	234	235	240	47	53	41	55	53
Moderate	90	92	93	97	96	45	46	49	49	54
Severe	54	56	58	56	60	40	45	49	47	50
<b>Total Hereditary</b>	<b>1,750</b>	<b>1,815</b>	<b>1,858</b>	<b>1,903</b>	<b>1,980</b>	<b>709</b>	<b>765</b>	<b>749</b>	<b>780</b>	<b>823</b>
Total Acquired HMA	30	32	40	44	23	7	7	6	13	<5
<b>Total</b>	<b>1,780</b>	<b>1,847</b>	<b>1,898</b>	<b>1,947</b>	<b>2,003</b>	<b>716</b>	<b>772</b>	<b>755</b>	<b>793</b>	<b>826</b>

\* As noted in the section *Data quality issues* (p15) the data has been improved since previous ABDR Annual Reports. The figures presented here represent the most accurate data currently available. The census date for number of people in the registry is 30 June, the last day of the financial year. Patients can have their severity categorised as 'unknown' or 'not applicable' during the initial diagnosis procedures, and these figures are not shown in this table. Excludes those severities recorded as *Unknown, Not Applicable and Blank*.

TABLE 7 - NUMBER OF PAEDIATRIC AND ADOLESCENT PATIENTS IN THE REGISTRY AND TREATED BY BROAD DIAGNOSIS AND SEVERITY FOR HMA, HMB

Paediatric and Adolescent (aged less than 18 years)	Number in ABDR Registry*					Number who Received Product*				
	2011-12	2012-13	2013-14	2014-15	2015-16	2011-12	2012-13	2013-14	2014-15	2015-16
<b>Hereditary</b>										
<b>HMA</b>										
Mild	170	169	171	183	205	43	54	50	54	56
Moderate	66	67	69	68	66	53	55	50	56	52
Severe	257	263	265	266	275	247	250	252	249	247
<b>HMB</b>										
Mild	48	47	52	51	54	9	9	17	14	13
Moderate	17	19	20	21	21	14	14	14	16	13
Severe	41	40	39	41	42	38	39	35	37	35
<b>Total Hereditary</b>	<b>599</b>	<b>605</b>	<b>616</b>	<b>630</b>	<b>663</b>	<b>404</b>	<b>421</b>	<b>418</b>	<b>426</b>	<b>416</b>
Total Acquired HMA	<5	<5	<5	<5	<5			<5	<5	
<b>Total</b>	<b>600</b>	<b>606</b>	<b>618</b>	<b>632</b>	<b>664</b>	<b>404</b>	<b>421</b>	<b>420</b>	<b>427</b>	<b>416</b>

\* As noted in the section *Data quality issues* (p15) the data has been improved since previous ABDR Annual Reports. The figures presented here represent the most accurate data currently available. The census date for number of people in the registry is 30 June, the last day of the financial year. Excludes those severities recorded as *Unknown, Not Applicable and Blank*.



## BY AGE GROUP AND DETAILED DIAGNOSIS

In the next two tables, data is presented for Adult (aged 18 years and over) and Paediatric and Adolescent (aged under 18 years) patients.

TABLE 8 - NUMBER OF PEOPLE IN THE REGISTRY DIAGNOSED WITH HMA OR HMB BY AGE GROUP AND DISEASE CLASSIFICATION

	Number in ABDR Registry*					Number who Received Product during the year				
	2011-12	2012-13	2013-14	2014-15	2015-16	2011-12	2012-13	2013-14	2014-15	2015-16
<b>Hereditary</b>										
<b>HMA – Adult (aged 18 years and over)</b>										
Asymptomatic Carrier Factor VIII Deficiency	194	211	232	181	216	<5	7	<5	6	<5
Factor VIII Deficiency	1,202	1,239	1,264	1,293	1,441	562	604	592	615	658
Symptomatic Carrier Factor VIII Deficiency **	123	133	141	154	86	13	13	16	11	7
<b>HMA – Paediatric (aged less than 18 years)</b>										
Asymptomatic Carrier Factor VIII Deficiency	<5	7	9	9	10					
Factor VIII Deficiency	478	484	488	500	531	341	358	350	357	353
Symptomatic Carrier Factor VIII Deficiency	17	17	21	21	17	<5	<5	<5	<5	<5
<b>HMB – Adult (aged 18 years and over)</b>										
Asymptomatic Carrier Factor IX Deficiency	45	46	49	42	44	<5				<5
Factor IX Deficiency	307	319	322	321	360	125	136	133	142	152
Symptomatic Carrier Factor IX Deficiency	41	43	47	51	25	7	8	6	9	5
<b>HMB – Paediatric (aged less than 18 years)</b>										
Asymptomatic Carrier Factor IX Deficiency	<5	<5	5	5	<5					
Factor IX Deficiency	100	99	102	105	111	60	61	66	67	61
Symptomatic Carrier Factor IX Deficiency	5	7	7	6	5	<5	<5			
<b>Acquired</b>										
<b>HMA – Adult (aged 18 years and over)</b>	43	39	47	57	73	9	10	7	22	13
<b>HMA – Paediatric (aged less than 18 years)</b>	<5	<5	<5	<5	<5			<5	<5	
<b>HMB – Adult (aged 18 years and over)</b>										<5

\* As noted in the section *Data quality issues* (p15) the data has been improved since previous ABDR Annual Reports. The figures presented here represent the most accurate data currently available. The census date for number of people in the registry is 30 June, the last day of the financial year. \*\* Symptomatic carriers transitioned to asymptomatic carriers and Haemophilia Factor VIII Deficiency patients, accounts for ongoing data quality changes in patient counts in 2015-16.

TABLE 9 - NUMBER OF PEOPLE IN THE REGISTRY DIAGNOSED WITH VWD BY AGE GROUP AND DISEASE CLASSIFICATION

	Number in ABDR Registry*					Number who Received Product during the year				
	2011-12	2012-13	2013-14	2014-15	2015-16	2011-12	2012-13	2013-14	2014-15	2015-16
<b>Hereditary</b>										
<b>VWD – Adult (aged 18 years and over)</b>										
von Willebrand Disease - Uncharacterised	282	255	263	231	176	11	6	11	9	6
von Willebrand Disease Type 1	885	958	1,016	1,023	1,123	75	96	108	107	116
von Willebrand Disease Type 2	274	296	320	354	394	50	56	60	68	86
von Willebrand Disease Type 3	31	32	34	35	35	20	24	24	26	27
<b>VWD – Paediatric (aged less than 18 years)</b>										
von Willebrand Disease - Uncharacterised	60	58	55	48	43	<5	<5	<5	<5	<5
von Willebrand Disease Type 1	216	217	220	210	205	13	17	22	20	21
von Willebrand Disease Type 2	86	96	97	105	108	15	13	13	16	22
von Willebrand Disease Type 3	8	9	8	6	8	7	6	8	5	7
<b>Acquired</b>										
<b>VWD – Adult (aged 18 years and over)</b>	12	12	17	19	22	<5	5	5	<5	8
<b>VWD – Paediatric (aged less than 18 years)</b>	<5	<5	<5							

\* As noted in the section *Data quality issues* (p15) the data has been improved since previous ABDR Annual Reports. The figures presented here represent the most accurate data currently available. The census date for number of people in the registry is 30 June, the last day of the financial year.

## BY LOCATION

Figure 3 depicts the geographic distribution of patients in the ABDR. Patient distribution is largely in line with the distribution of the general population. However, a more detailed analysis of geographic distribution could be expected to reveal the clustering effects often associated with the distribution of genetic disorder. Excluded from Figure 3 are 33 patients that have unknown or other locations (down from 35 in 2014-15).

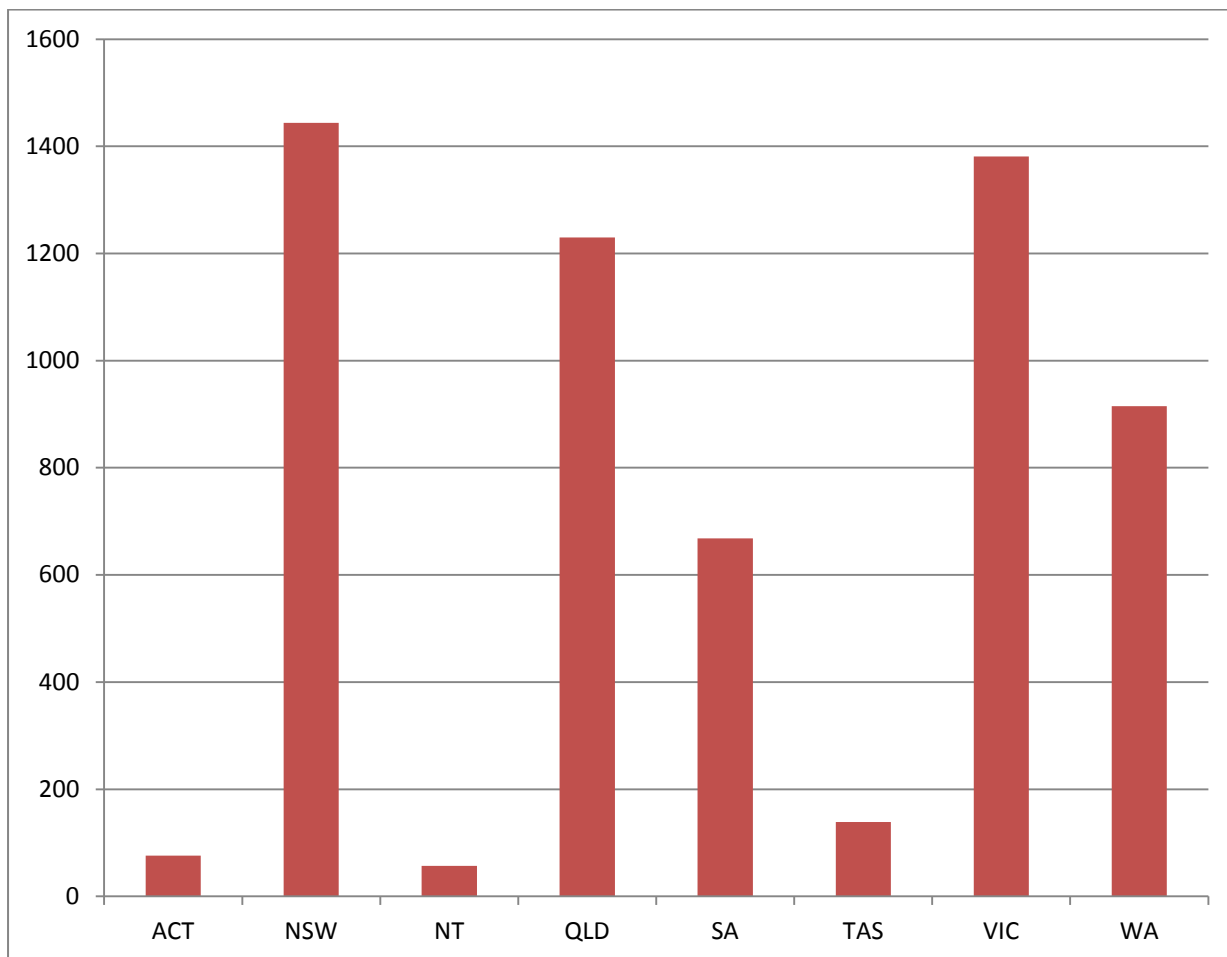


FIGURE 3 - NUMBERS OF ACTIVE PATIENTS IN THE REGISTRY AS AT 30 JUNE 2016

Table 10 lists the numbers of patients with severe hereditary HMA and HMB by state and territory; there are patients who have been excluded due to having another location. Table 11 lists the numbers of patients with acquired HMA by state and territory; there are patients who have been excluded due to having another location. The totals in these tables include the patients in other/unknown locations

TABLE 10 - NUMBERS OF PATIENTS WITH SEVERE HMA AND HMB BY LOCATION - HEREDITARY BLEEDING DISORDERS

State/Territory	HMA	HMB
ACT	15	<5
NSW	192	34
NT	<5	
QLD	153	19
SA	54	<5
TAS	15	<5
VIC	151	32
WA	71	10
<b>Total</b>	<b>*660</b>	<b>102</b>

\* As noted in the section *Data quality issues* (p15) the data has been improved since previous ABDR Annual Reports. The figures presented here represent the most accurate data currently available. The census date for number of people in the registry is 30 June, the last day of the financial year. Totals include those locations recorded as *Unknown and Other*.

TABLE 11 - NUMBERS OF PATIENTS WITH HMA BY LOCATION - ACQUIRED BLEEDING DISORDERS

State/Territory	HMA
ACT	
NSW	13
NT	<5
QLD	23
SA	<5
TAS	<5
VIC	24
WA	7
<b>Total</b>	<b>*74</b>

\* As noted in the section *Data quality issues* (p15) the data has been improved since previous ABDR Annual Reports. The figures presented here represent the most accurate data currently available. The census date for number of people in the registry is 30 June, the last day of the financial year. Totals include those locations recorded as *Unknown and Other*.

Table 12 lists the numbers of male patients with severe HMA and HMB by state and territory; there are 5 patients who have been excluded due to having another location.

**TABLE 12 - NUMBERS OF PATIENTS WITH SEVERE HMA AND HMB BY LOCATION - HEREDITARY BLEEDING DISORDERS - MALE**

<b>State/Territory</b>	<b>HMA</b>	<b>HMB</b>
ACT	15	<5
NSW	191	34
NT	<5	
QLD	150	19
SA	53	<5
TAS	15	<5
VIC	151	32
WA	71	9
<b>Total</b>	<b>*655</b>	<b>101</b>

\* As noted in the section *Data quality issues* (p15) the data has been improved since previous ABDR Annual Reports. The figures presented here represent the most accurate data currently available. The census date for number of people in the registry is 30 June, the last day of the financial year. Totals include those locations recorded as *Unknown and Other*.

## BY GENDER AND AGE DISTRIBUTION

The figures in this section present the gender and age distribution of patients in the ABDR in 2015-16, compared to the general Australian population<sup>3</sup>. The general population are represented by vertical bars and the ABDR patients are represented by line plots.

Figure 4 - Distribution of hereditary female HMA patients by age in 2015-16 charts the distribution of all female hereditary HMA patients against the female population.

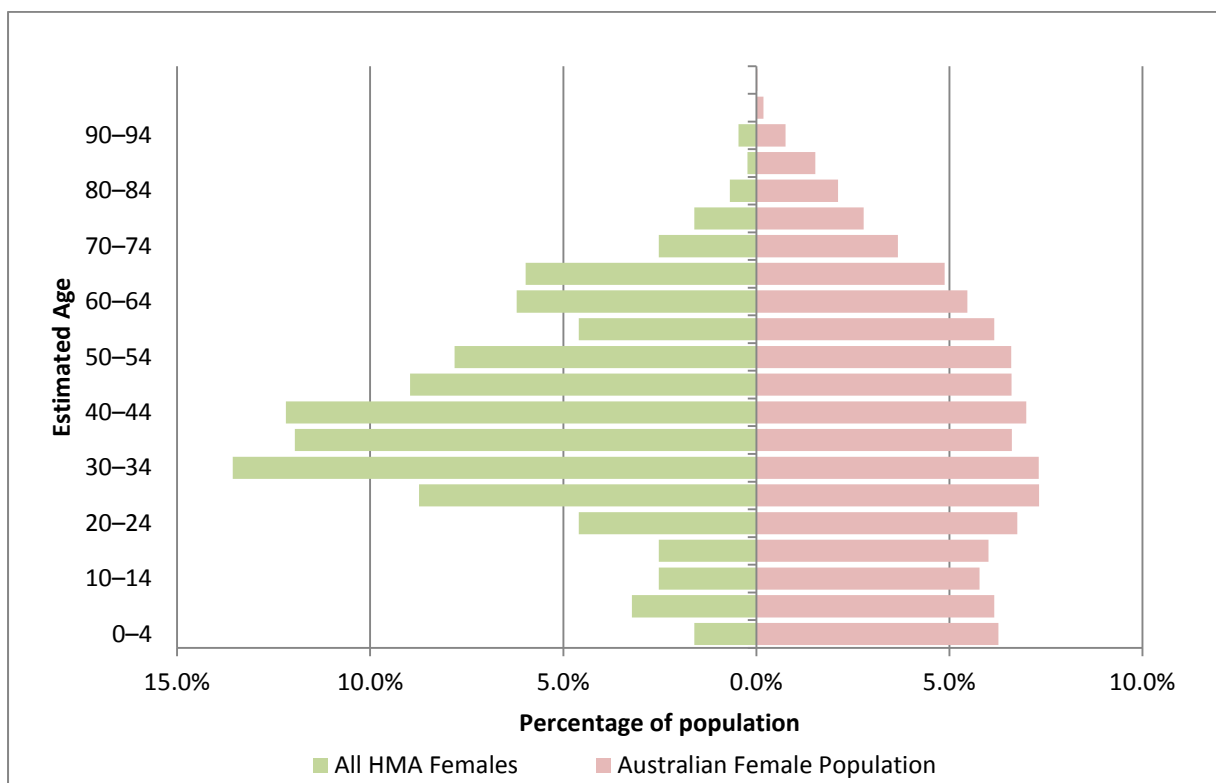


FIGURE 4 - DISTRIBUTION OF HEREDITARY FEMALE HMA PATIENTS BY AGE IN 2015-16

Figure 5 charts the distribution of all male hereditary HMA patients and all male severe hereditary HMA patients against the male population. The disorder is genetically linked to a patient’s gender, and usually affects males. There are a relatively lower number of older patients (from the age grouping of 75-79 years onwards). The life expectancy of HMA patients has improved dramatically<sup>4</sup> in recent decades. The younger cohorts can expect to survive longer, which will increase the overall patient population and the demand for product in the future.

The number of acquired HMA severe male patients totalled 15.

Figure 6 charts the distribution of all male hereditary HMB patients and all male severe hereditary HMB patients against the male population. As with HMA, HMB is also genetically linked to a patient’s gender, and usually affects males. The observed male severe HMB population does not conform to the

<sup>3</sup> Australian Bureau of Statistics, Australian Demographic Statistics, Cat. No. 3101.0 Released December 2015 (Table 59)

<sup>4</sup> Oldenburg J, Dolan G, Lemm G (2009). Haemophilia care then, now and in the future. Haemophilia 15, S1: 2-7.

same pattern as the general male population, however there are low patient numbers (n=101) in this group and no conclusions should be drawn.

There were no acquired HMB severe male patients.

Figure 7 and 8 charts the distribution of male and female VWD patients and all male and female severe VWD patients against the male and female populations.

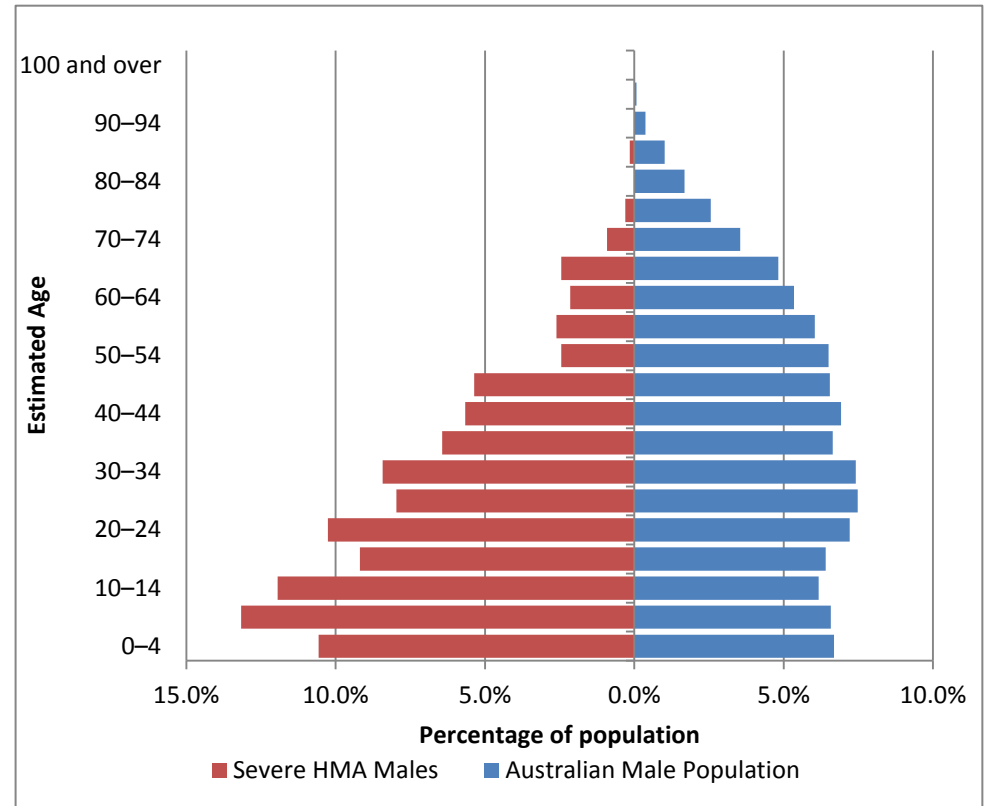
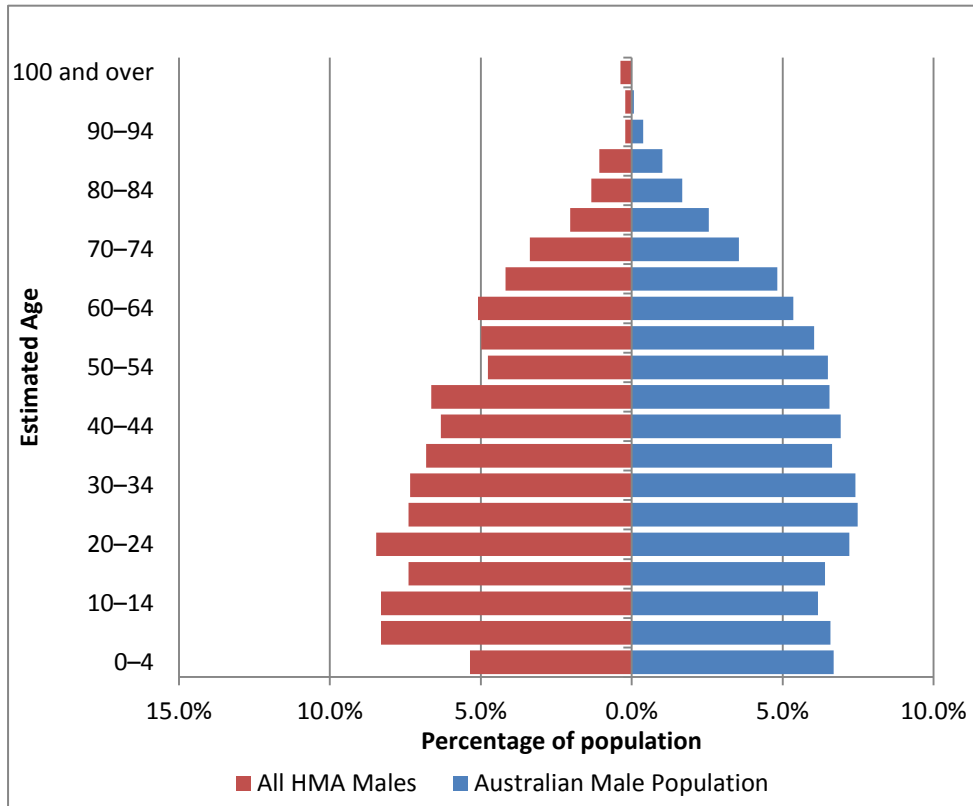


FIGURE 5 - DISTRIBUTION OF HEREDITARY MALE HMA PATIENTS AND MALE HMA SEVERE PATIENTS BY AGE IN 2015-16



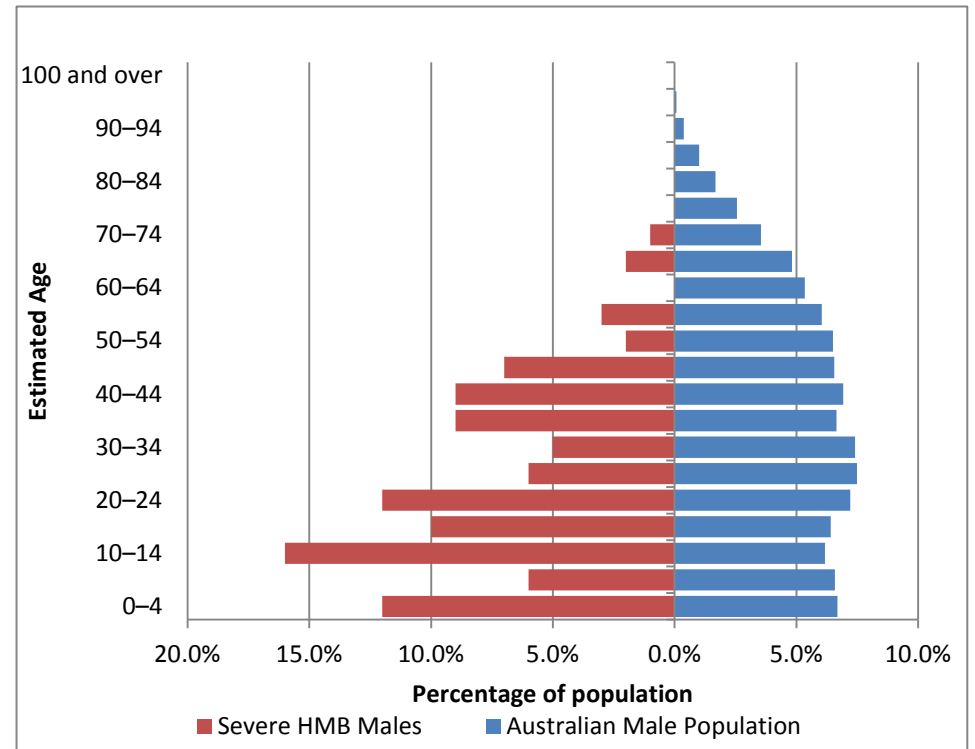
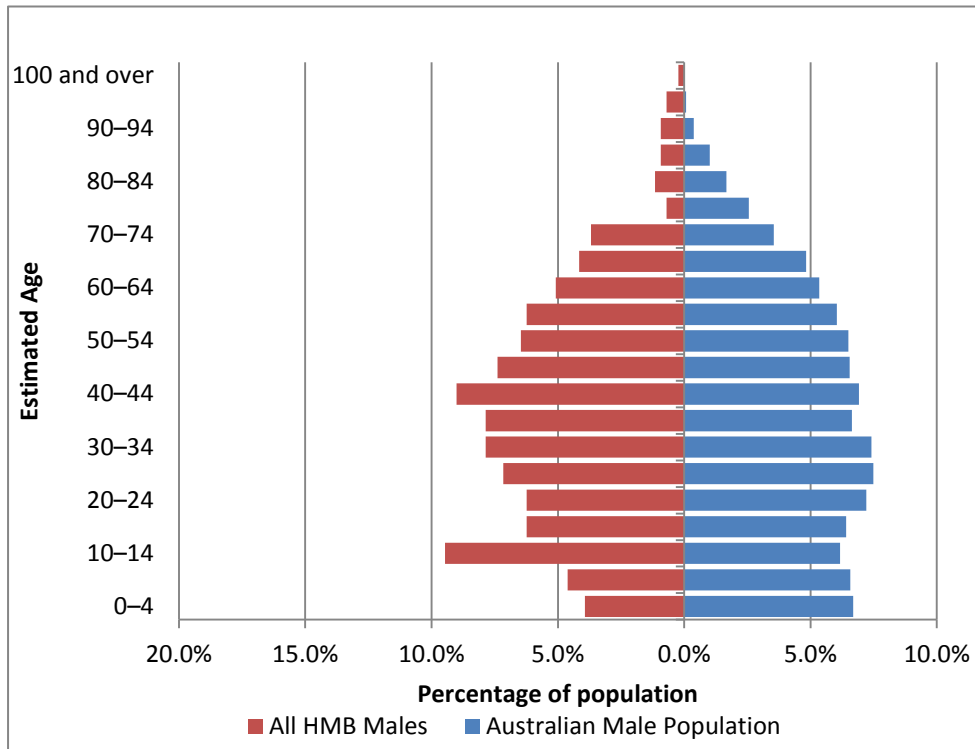


FIGURE 6 - DISTRIBUTION OF HEREDITARY MALE HMB PATIENTS AND MALE HMB SEVERE PATIENTS BY AGE IN 2015-16

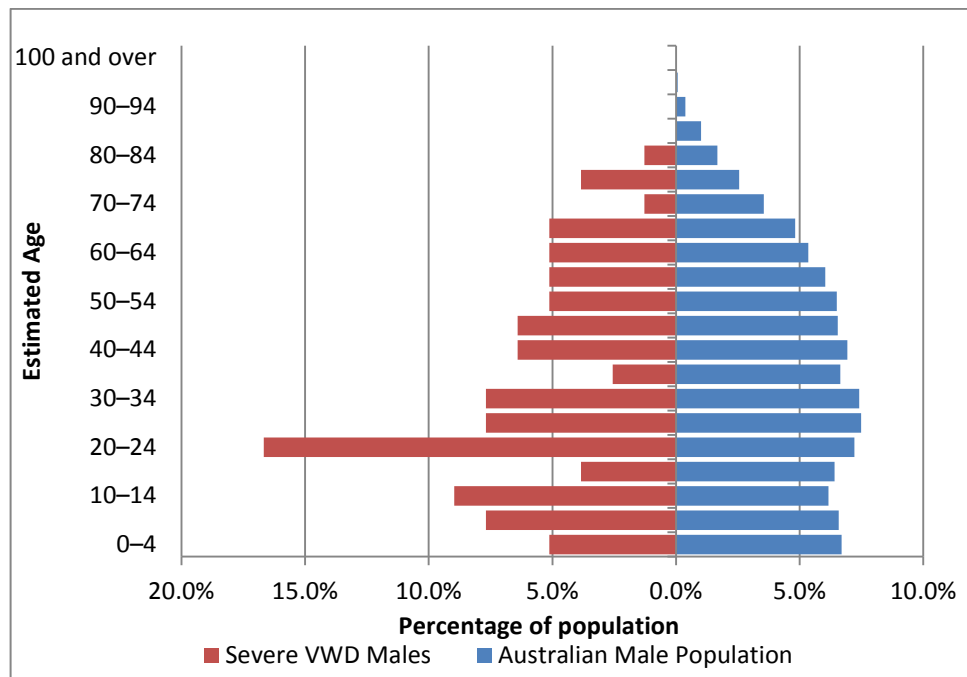
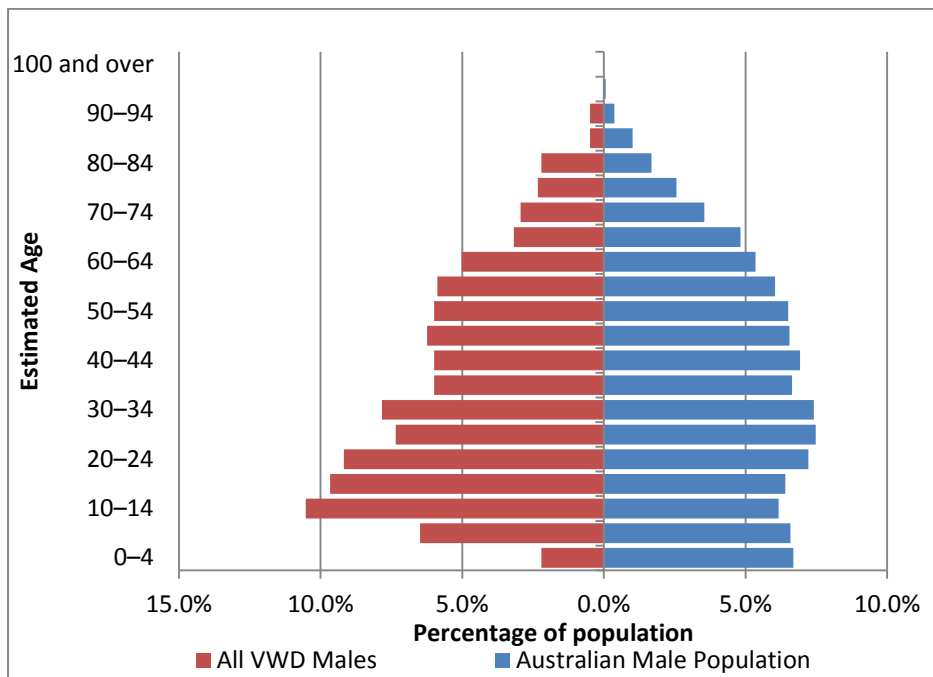


FIGURE 7 - DISTRIBUTION OF VWD MALE HMB PATIENTS AND VWD MALE SEVERE PATIENTS BY AGE IN 2015-16

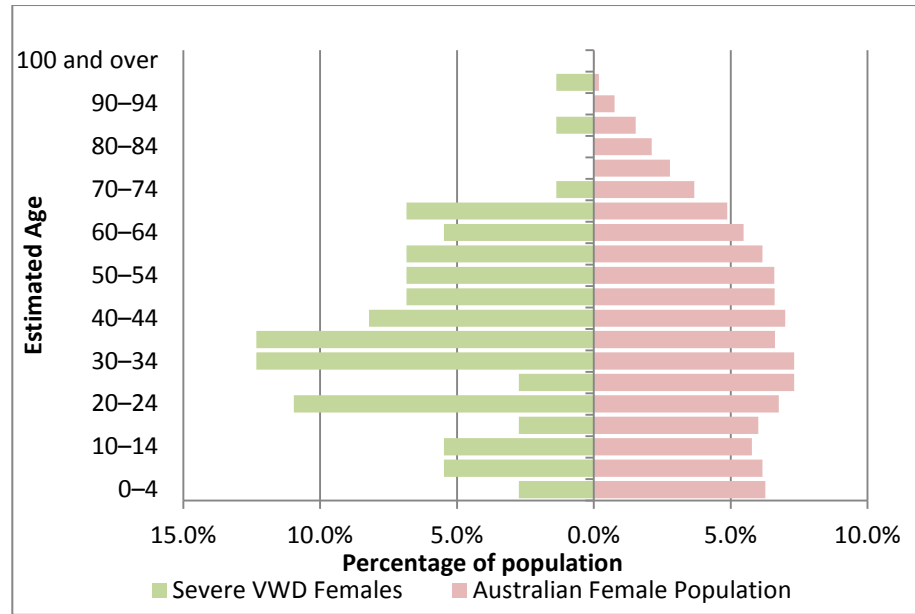
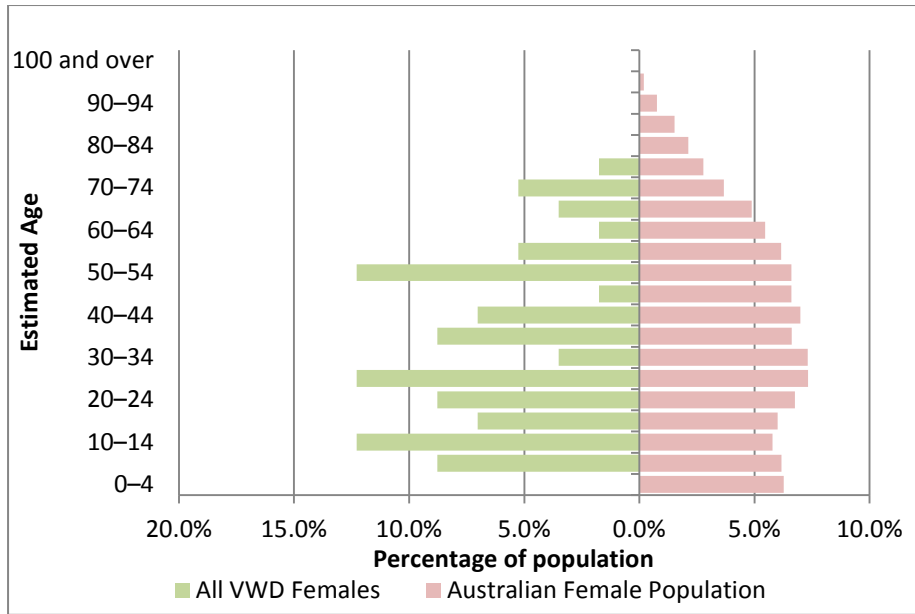


FIGURE 8 - DISTRIBUTION OF VWD FEMALE PATIENTS AND VWD FEMALE SEVERE PATIENTS BY AGE IN 2015-16

## INHIBITOR STATUS

Table 13 provides a description of the inhibitor status used in the ABDR. Table 14 shows the status of inhibitors for patients as at 30 June 2016. Inhibitors are immunoglobulins made by the body's immune system to react against replacement clotting factor proteins. This occurs when the immune system perceives the proteins as foreign or harmful to the body. When this happens, the inhibitors prevent the usual replacement factors (Factor VIII or IX) from working properly to stop bleeding.

Inhibitor detection is conducted using the Bethesda assay, with or without the Nijmegen modification (Verbruggen et al. 1995), and results are expressed in Bethesda units (BU)<sup>5</sup>. If the inhibitor titre is high (>5 BU/ml), factor replacement therapy is ineffective and bleeding persists. With low titre inhibitor (<5 BU/ml), haemostasis may be achieved with higher doses. Patients with severe Haemophilia A with high-titre inhibitors are most at risk for recurrent bleeds and chronic haemarthroses.

FEIBA and Recombinant Factor VIIa (brand name NovoSeven) are both used to treat patients that have developed inhibitors. In the setting of managing inhibitors for haemophilia, the drivers for clinical demand for FEIBA are similar to those for NovoSeven. Predicting or interpreting changing demand trends is not possible with any accuracy, as the product is only used in a small number of patients each year. Use patterns will vary from year to year and will not only depend on the number of patients treated, but their severity of disease, the potency of inhibitors, whether secondary prophylaxis is practiced, the number and severity of spontaneous bleeds, and the amount of elective surgery undertaken in this patient group.

TABLE 13 - DESCRIPTION OF INHIBITOR STATUS USED IN ABDR

Inhibitor Event Type	Screening or Inhibitor Status
Initial Inhibitor Status	<ul style="list-style-type: none"> <li><i>Inhibitor Testing Not Performed</i> - No inhibitor test has ever been performed for this patient</li> <li><i>Unknown</i> – Used if a patient has been tested but the results are unknown (i.e. transferred from overseas)</li> </ul>
Screening Test Result	<ul style="list-style-type: none"> <li><i>Negative</i> - Patient has a negative screening test result (then enter Inhibitor Status)</li> <li><i>Equivocal</i> - Not determined</li> <li><i>Present</i> - Patient has a positive screening test result</li> </ul>
Screening Test (Result is Negative) or Inhibitor Test	<ul style="list-style-type: none"> <li><i>Currently present – not on ITI</i> - Patient has an inhibitor but is not currently on ITI therapy</li> <li><i>Never Present</i> – No inhibitor detected for this test or previous tests performed</li> <li><i>Previously present – high responder (&gt;5 BU/mL)</i> – Patient is negative this occasion but previously had a high inhibitor level to FVIII / FIX where the titre level is greater than 5 BU/mL</li> <li><i>Previously present – low responder (&lt;5 BU/mL)</i> – Patient is negative this occasion but previously had a low inhibitor level to FVIII / FIX where the titre level less than 5 BU/mL</li> <li><i>On ITI</i> – Patient is on Immune Tolerance Induction (ITI)</li> </ul>

<sup>5</sup> Bethesda units (BU) = a measure of inhibitor activity – the amount of inhibitor that inactivates 50% or 0.5 units of a coagulation factor during the incubation period

Inhibitor Event Type	Screening or Inhibitor Status
	therapy or Tolerisation <ul style="list-style-type: none"> <li>• <i>Unknown</i> – recorded as blank</li> <li>• <i>Present</i> – Patient has a positive inhibitor test result (Migrated data from previous version of ABDR and can no longer be used)</li> <li>• <i>Historic</i> - Patient does not currently have an inhibitor but has previously had one (Migrated data from previous version of ABDR and can no longer be used)</li> <li>• <i>Tolerised</i> - Patient has previously had an inhibitor in the past and been successfully tolerised (Migrated data from previous version of ABDR and can no longer be used) previous titre eg high or low responder – not known</li> </ul>

TABLE 14 - PATIENT INHIBITOR STATUS NUMBERS

	30-Jun-15	30-Jun-16
<b>HMA</b>	<b>2,158</b>	<b>2,298</b>
Currently Present - Not on ITI	35	37
Equivocal	7	5
Historic	<5	<5
Inhibitor Testing Not Performed	754	846
Negative	8	6
Never Present	1,162	1,209
On ITI	19	17
Present	10	7
Previously Present - High Responder ( $\geq 5$ BU/mL)	69	70
Previously Present - Low Responder ( $< 5$ BU/mL)	90	99
Tolerised	<5	<5
<b>HMB</b>	<b>530</b>	<b>547</b>
Currently Present - Not on ITI	<5	<5
Equivocal	<5	
Inhibitor Testing Not Performed	277	278
Negative	<5	<5
Never Present	241	259
On ITI	<5	<5
Present		
Previously Present - High Responder ( $\geq 5$ BU/mL)	<5	<5
Previously Present - Low Responder ( $< 5$ BU/mL)	<5	<5
<b>VWD</b>	<b>2,012</b>	<b>2,081</b>
Inhibitor Testing Not Performed	1,961	2,035
Never Present	47	53
On ITI	<5	<5
Present		<5
Previously Present - High Responder ( $\geq 5$ BU/mL)	<5	<5

\* As noted in the section *Data quality issues* (p15) the data has been improved since previous ABDR Annual Reports. The figures presented here represent the most accurate data currently available. The census date for number of people in the registry is 30 June, the last day of the financial year.

## INCIDENCE OF MAJOR DISORDERS

When we consider the incidence of bleeding disorders in global terms we see great variety in data and the reported prevalence. Table 15 details the incidence statistics from the World Federation of Hemophilia (WFH) global survey 2015 released in 2016.

TABLE 15 - INCIDENCE STATISTICS FROM WORLD FEDERATION OF HEMOPHILIA GLOBAL SURVEY 2015

Country	Population	HMA/HMB	VWD	OBD	HMA/HMB per100,000	VWD per 100,000	OBD per 100,000	Factor VIII per capita	Factor IX per capita
Australia	23,781,169	2,451	2,012	648	10.31	8.46	2.72	6.165	1.112
New Zealand	4,595,700	441	224	43	9.60	4.87	0.94	5.890	0.733
UK	65,138,232	7,840	10,586	7,396	12.04	16.25	11.35	8.431	1.412
USA	321,418,820	18,596	13,845	6,567	5.79	4.31	2.04	8.254	1.532
Canada *	34,834,841	3,822	4,180	1,899	10.97	12.00	5.45	7.442	1.495
France *	66,808,385	6,848	1,865	476	10.25	2.79	0.71	7.09	1.101
Sweden	9,798,871	1,068	1,512	513	10.90	15.43	5.24	8.968	1.794
Germany	81,413,145	4,443	3,487	-	5.46	4.28	-	7.303	0.843
South Africa	54,956,920	2,184	630	220	3.97	1.15	0.40	0.962	0.127
Japan	126,958,472	6,050	1177	380	4.77	0.93	0.30	5.767	1.014

Abbreviations; OBD - other bleeding disorders; defined in the WFH Global Survey 2015 as “rare factor deficiencies, and inherited platelet disorders” (i.e. not HMA, HMB, VWD)

\* Canada’s figures are from the 2014 Annual Survey updated for population, France’s Factor VIII and Factor IX per capita figures are from the 2015 Annual Survey

In 2010, Stonebraker *et al*<sup>6</sup> reported on prevalence data for 106 countries from the WFH annual global surveys and the literature. They found that the reported HMA prevalence varied considerably among countries, even among the wealthiest of countries. Prevalence data reported from the WFH compared well with prevalence data from the literature, but patient registries (such as the ABDR) generally provided the highest quality prevalence data.

In 2011, the same group reported on the prevalence of Haemophilia B<sup>7</sup>. Data was reported for 105 countries from the WFH annual global surveys. They reported that the prevalence varied considerably among countries, even among the wealthiest of countries.

Prevalence data is extremely valuable information for the planning efforts of national healthcare agencies in setting priorities and allocating resources for the treatment of bleeding disorders.

<sup>6</sup> Stonebraker JS, Bolton-Maggs PHB, Soucie JM, Walker I, Brooker M. (2010). A study of variations in the reported hemophilia A prevalence around the world. *Haemophilia* 16(1): 20–32.

<sup>7</sup> Stonebraker JS, Bolton-Maggs PHB, Soucie JM, Walker I, Brooker M. (2011). A study of variations in the reported hemophilia B prevalence around the world. *Haemophilia* 18(3): 1-4.

# Patient Treatment in 2015-16

The data in this section relates to patients who received treatment (products) during the 2015-16 financial year. Figure 9 and Figure 10 show data for the period 2011-12 to 2015-16, and chart the relative volume of therapeutic products issued according to patient severity. Patients with greater severity of bleeding disorders received more products.

## PRODUCTS ISSUED TO PATIENTS

Figure 9 shows the proportion of hereditary HMA patients receiving treatment (958 patients in 2015-16) by severity. For the five financial years, around 60% (by volume) of all FVIII products issued were for patients with severe HMA.

Figure 10 shows the proportion of hereditary HMB patients receiving treatment (196 patients in 2015-16) by severity. For the five financial years, around 40% (by volume) of all FIX products issued were for patients with severe HMB. There are far fewer HMB patients in the registry than there are HMA patients.

About half of the patients in the ABDR are diagnosed with HMA (see Table 3). In relative terms, HMA is the most important consideration for national supply planning, and the key factor is the issue of product to severe HMA patients.

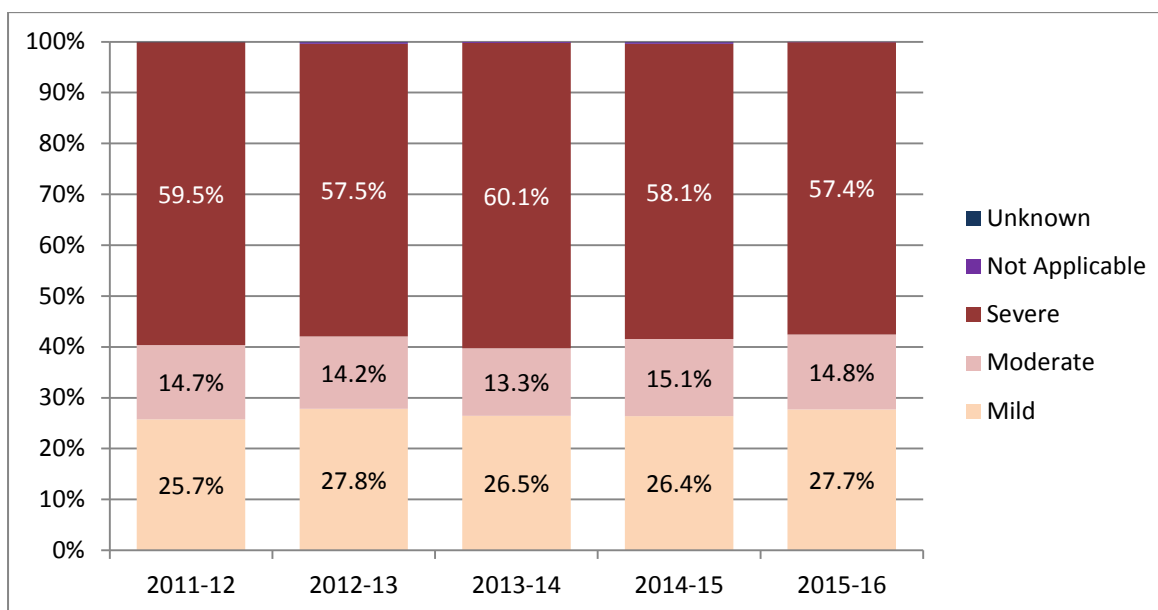


FIGURE 9 - PERCENTAGE OF PATIENTS RECEIVING PRODUCT BY SEVERITY FOR HMA - HEREDITARY BLEEDING DISORDERS

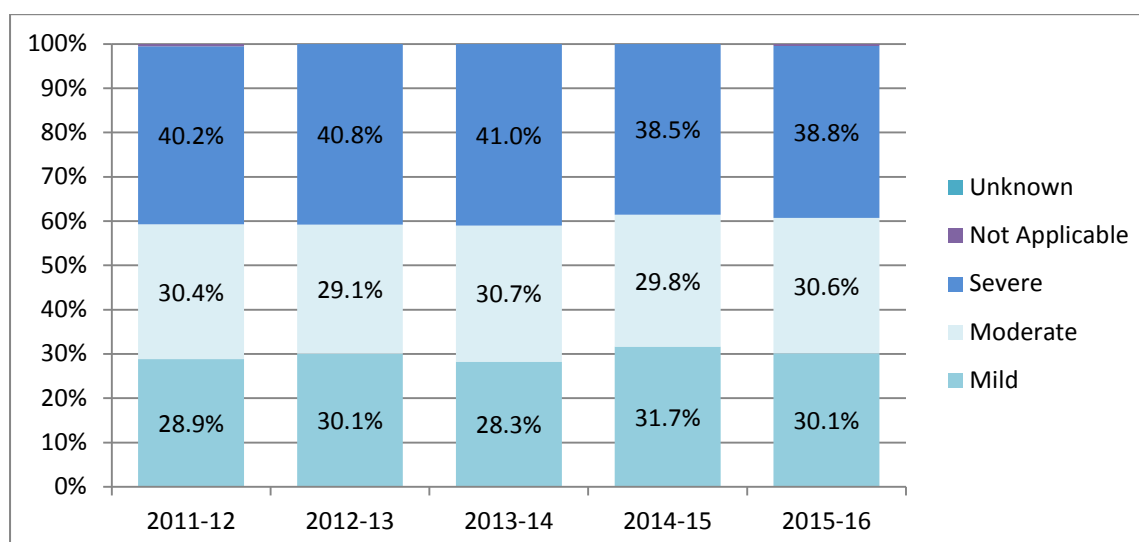


FIGURE 10 - PERCENTAGE OF PATIENTS RECEIVING PRODUCT BY SEVERITY FOR HMB - HEREDITARY BLEEDING DISORDERS

Note: Proportion of patients receiving product by severity for HmB – Acquired bleeding disorders are too small to present in graphical format.

Table 16-18 detail the volume (IU) of product issued for HMA, HMB and VWD and other diagnosis patients in 2015-16. The volumes are subdivided by severity and treatment regimen as stated in the ABDR record. The largest and most important sectors are products for severe HMA patients for *on demand* and *prophylactic* treatment regimens. The volume issued for prophylactic treatment of severe HMA is the single greatest determining factor for supply planning.

TABLE 16 - IU OF PRODUCT ISSUED FOR HMA, HMB AND VWD PATIENTS, BY SEVERITY AND TREATMENT REGIMEN IN 2015-16 - HEREDITARY BLEEDING DISORDERS

	Mild	Moderate	Severe	Unknown*	Total**
<b>HMA (IU FVIII Products)†</b>	<b>5,443,050</b>	<b>17,471,250</b>	<b>133,437,318</b>	<b>4,000</b>	<b>156,355,618</b>
On Demand	3,874,300	6,172,750	19,637,743	4,000	29,688,793
Prophylaxis	1,199,250	11,146,500	108,601,075		120,946,825
Tolerisation		120,000	4,869,250		4,989,250
Unknown*	369,500	32,000	329,250		730,750
<b>HMB (IU FIX Products)‡</b>	<b>1,898,250</b>	<b>7,821,750</b>	<b>16,568,500</b>	<b>4,000</b>	<b>26,292,500</b>
On Demand	1,583,750	2,708,000	4,683,750	4,000	8,979,500
Prophylaxis	261,500	4,820,750	11,437,750		16,520,000
Tolerisation			447,000		447,000
Unknown*	53,000	293,000			346,000
<b>VWD (IU FVIII Product) ++</b>	<b>371,250</b>	<b>516,250</b>	<b>3,384,000</b>	<b>1,633,250</b>	<b>5,904,750</b>
On Demand	320,000	422,500	1,100,000	573,750	2,416,250
Prophylaxis	10,250	39,000	2,212,000	1,001,000	3,262,250
Tolerisation			72,000		72,000
Unknown*	41,000	54,750		58,500	154,250

† FVIII Products included are Advate, Benefix, Biostate, Kogenate and Xyntha

‡ FIX Products included are BeneFIX, Kogenate and MonoFIX



++ FVIII Products include Biostate

\* This represents a blank/not completed/empty field for the treatment regimen in the ABDR

\*\* The total in this table combines the values for patients with mild, moderate and severe conditions. The severity of a patient's condition is not always known at initial presentation. This table includes product issues to patients with unknown severities.

**TABLE 17 - IU OF PRODUCT ISSUED FOR HMA, HMB AND VWD PATIENTS, BY SEVERITY AND TREATMENT REGIMEN IN 2015-16 - ACQUIRED BLEEDING DISORDERS**

	Mild	Moderate	Severe	Unknown*	Total**
<b>HMA (IU FVIII Products)†</b>		<b>6,000</b>		<b>118,000</b>	<b>124,000</b>
On Demand		6,000		103,000	109,000
Unknown*				15,000	15,000
<b>HMB (IU FIX Products)‡</b>				<b>18,500</b>	<b>18,500</b>
Unknown*				18,500	18,500
<b>VWD (IU FVIII Product) ++</b>	<b>21,500</b>			<b>86,500</b>	<b>108,000</b>
On Demand	21,500			50,000	71,500
Unknown*				36,500	36,500

† FVIII Products included are Advate, Benefix, Biostate, Kogenate and Xyntha

‡ FIX Products included are BeneFIX, Kogenate and MonoFIX

++ FVIII Products include Biostate

**TABLE 18 - IU OF PRODUCTS ISSUED FOR OTHER PATIENTS, BY SEVERITY AND TREATMENT REGIMEN IN 2015-16 - OTHER DIAGNOSES**

	Mild	Moderate	Severe	Unknown*	Total**
<b>Other Factor Deficiency</b>	<b>107,712</b>	<b>57,015</b>	<b>161,752</b>	<b>16,100</b>	<b>342,579</b>
On Demand	104,468	2,515	5,252	5,000	117,235
Prophylaxis	3,242	54,500	156,500	6,000	220,242
Unknown*	2			5,100	5,102
<b>Other</b>	<b>3,000</b>			<b>192,000</b>	<b>195,000</b>
On Demand	3,000				3,000
Prophylaxis				192,000	192,000
Unknown*					0

† FVIII Products included are Advate, Benefix, Biostate, Kogenate and Xyntha

‡ FIX Products included are BeneFIX, Kogenate and MonoFIX

++ FVIII Products include Biostate

## VOLUME (IU) OF PRODUCTS ISSUED FOR HMA AND HMB

Severe haemophilia requires lifelong treatment with expensive products. Clotting factor consumption is often expressed in IU/kg/year, and the ranges reported vary by population.<sup>8,9</sup> Figure 11 shows the clotting factor consumption of FVIII during 2015-16 for severe HMA patients on prophylaxis. There is a wide range of use across these age groups, which are not normally distributed. Median values for each age bracket are listed below. Note there are significant outliers which require further investigation

Median IU/Kg/year	0-4 years	5-9 years	10-14 years	15-17 years	Adult
2015-16	4,819	4,459	4,525	2,294	3,133

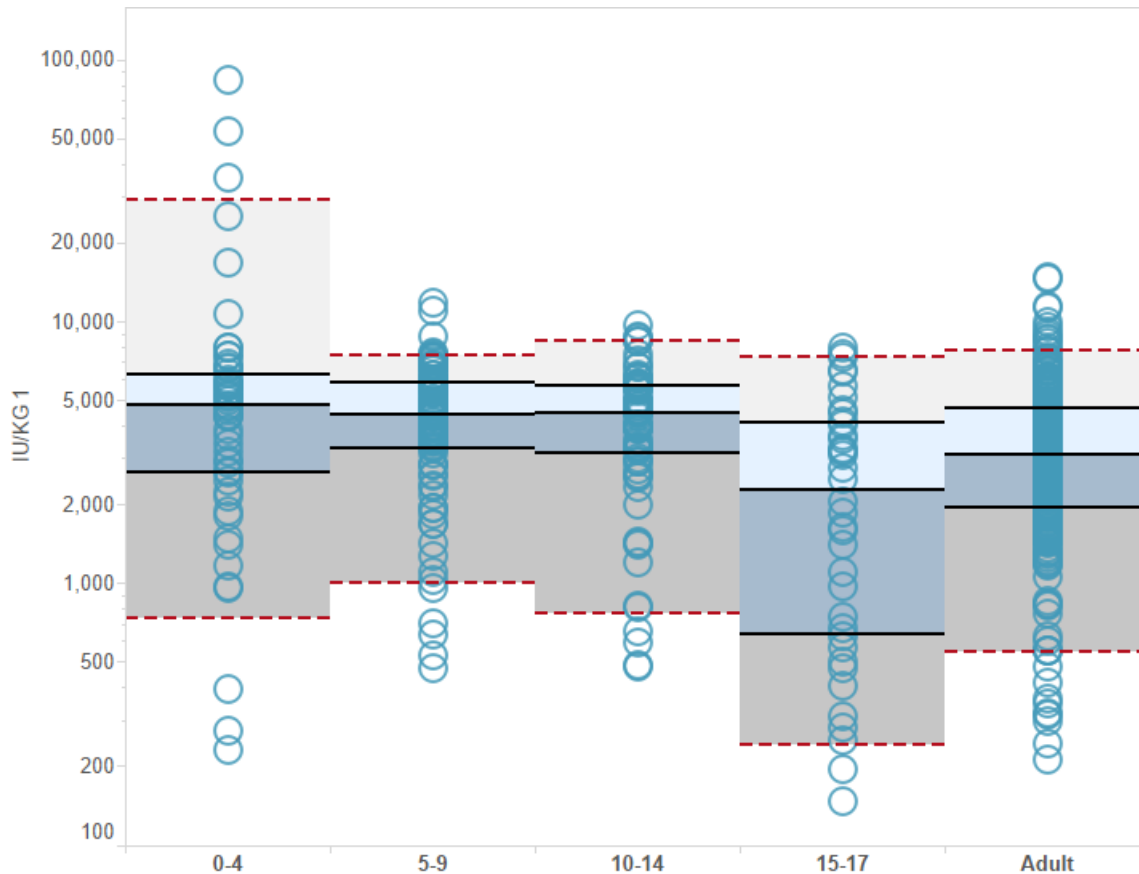


FIGURE 11 - FVIII PRODUCT USAGE (IU/KG/YEAR) IN SEVERE HMA PATIENTS ON PROPHYLAXIS

<sup>8</sup> Schramm W, Royal S, Kroner B, Berntorp E, Giangrande P, Ludlam CA, et al. (2002). Clinical outcomes and resource utilization associated with haemophilia care in Europe. *Haemophilia* 8(1): 33-43.

<sup>9</sup> Aledort LM, Haschmeyer RH, Pettersson H (1994) A longitudinal study of orthopaedic outcomes for severe factor-VIII-deficient haemophiliacs. The Orthopaedic Outcome Study Group. *J Intern Med.* 236(4): 391-399.

Figure 12 shows the clotting factor consumption of FVIII during 2015-16 for severe HMA patients on demand regimen. As in previous years there is a wide range of use across the paediatrics (includes adolescents) and adult age groups, which are not normally distributed.

Median IU/Kg/year	Paediatric	Adult
2015-16	251	1,865

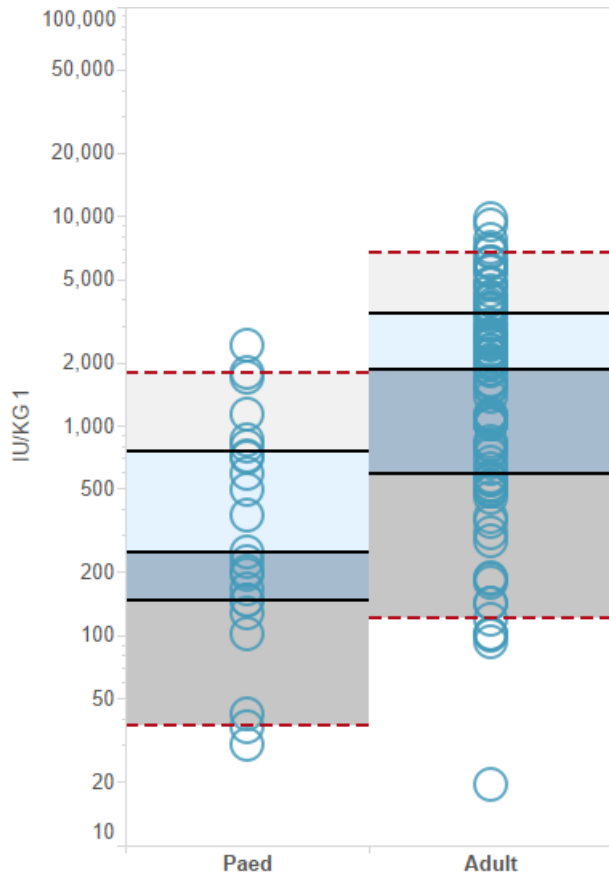


FIGURE 12 - FVIII PRODUCT USAGE (IU/KG/YEAR) IN SEVERE HMA PATIENTS ON DEMAND

Figure 13 shows the clotting factor consumption during 2015-16 for severe HMB patients on prophylaxis regimen.

Median IU/Kg/year	0-4 years	5-9 years	10-14 years	15-17 years	Adult
2015-16	4,391	2,559	2,618	2,424	3,052

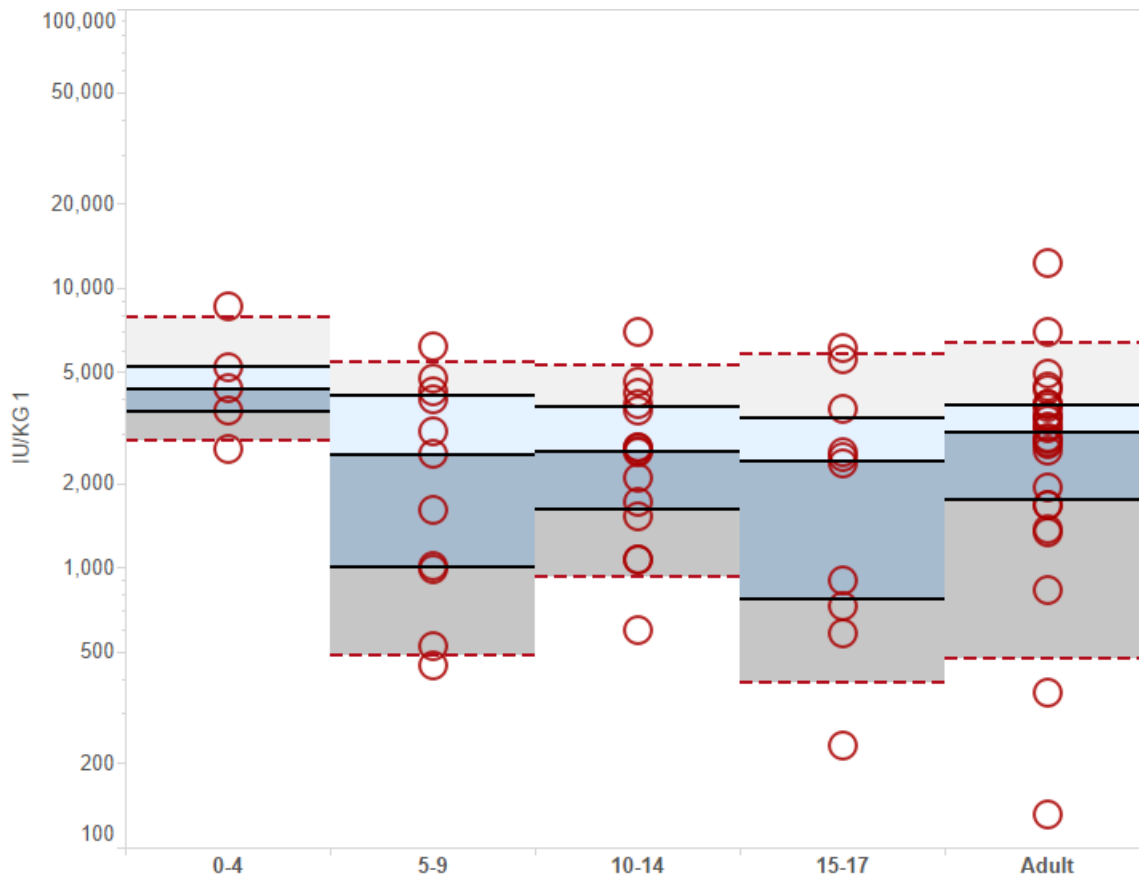


FIGURE 13 - FIX PRODUCT USAGE (IU/KG/YEAR) IN SEVERE HMB PATIENTS ON PROPHYLAXIS

Figure 14 shows the clotting factor consumption during 2015-16 for severe HMB patients on demand regimen.

Median IU/Kg/year	Paediatric	Adult
2015-16	258	1,648

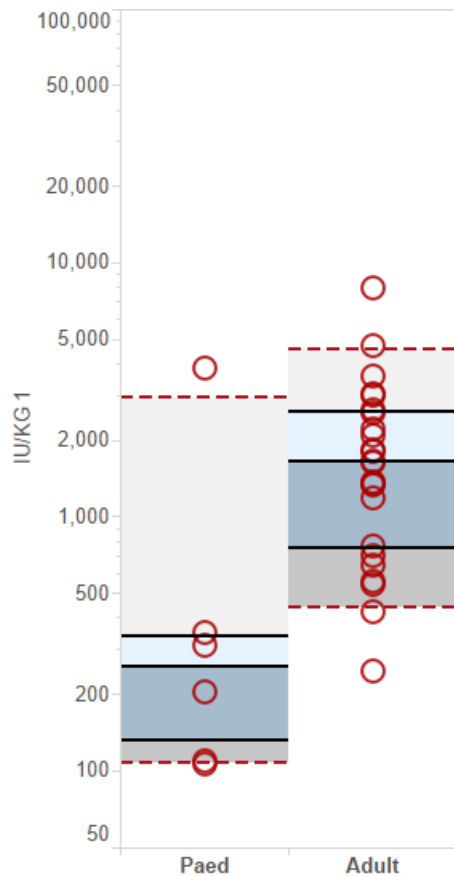


FIGURE 14 - FIX PRODUCT USAGE (IU/KG/YEAR) IN SEVERE HMB PATIENTS ON DEMAND

These figures are higher than some of those reported in the literature for adult patients, but reflect the shift in treatment practice towards regular prophylactic infusions to prevent bleeds, especially in children. Recent theoretical work allowed for the comparison of different treatment strategies, ranging from long-term on demand therapy to different prophylactic strategies.<sup>10</sup> In time the ABDR data should provide further insight into these issues.

<sup>10</sup> Fischer K, Pouw ME, Lewandowski D, Janssen MP, van den Berg HM, van Hout BA (2011). A modelling approach to evaluate long-term outcome of prophylactic and on demand treatment strategies for severe hemophilia A. *Haematologica* 96(5): 738-743.

## VOLUME OF PRODUCTS ISSUED BY TREATMENT REGIMEN, SEVERITY, PRODUCT AND STATE

Table 19-20 show the volumes issued by product and treatment regimen, for hereditary and other diagnosis. In both the adult and paediatric (includes adolescents) age groups the majority of product is issued for patients on prophylactic treatment regimens, followed by on demand regimens. The ABDR product issues data contains records where the treatment regimen is blank, unknown and not specified.

Table 21 and 22 list the number of patients and volumes issued by product and state. The totals are distinct counts of Patients who received product and may be counted more than once under each state as they may have received product from more than one state throughout the year. This is for both hereditary and acquired HMA, HMB and VWD.

Table 23 shows the number of patients, volume issued and IU or mg/kg/year of products issued in 2015-16 by treatment regimen for acquired HMA, HMB and VWD.

Table 24 lists the number of patients and IUs issued by severity and regimen type for hereditary HMA and HMB. Values in this table exclude products issued to patients with unknown severity classification or treatment regimen, so they will vary from those figures shown in other parts of this report. Also patients may receive more than one regimen type and may therefore be counted multiple times.

Table 25 shows the number of patients and volume of products issued by regimen type and product for hereditary HMA, HMB, and VWD. Values in this table exclude products issued to patients with unknown treatment regimen, so they may vary from those figures shown in other parts of this report. Also patients may receive more than one regimen type and may therefore be counted multiple times.

TABLE 19 - VOLUME OF PRODUCTS ISSUED IN 2015-16 BY TREATMENT REGIMEN - HEREDITARY BLEEDING DISORDERS

	Adult					Paediatric				
	On Demand	Prophylaxis	Tolerisation	Not specified	Adult Total *	On Demand	Prophylaxis	Tolerisation	Not specified	Paediatric Total *
<b>HMA (IUs)</b>	<b>30,248,800</b>	<b>76,155,000</b>	<b>2,093,500</b>	<b>697,000</b>	<b>109,194,300</b>	<b>1,142,250</b>	<b>45,717,000</b>	<b>3,477,250</b>	<b>33,750</b>	<b>50,370,250</b>
Advate	15,219,050	32,900,000	120,000	369,000	48,608,050	868,500	22,560,000	1,246,250	32,000	24,706,750
Biostate	1,098,500	1,805,500	1,285,000	21,000	4,210,000	13,000	3,446,250	1,364,000	1,750	4,825,000
Kogenate FS	101,000	26,250			127,250	7,500	708,250	570,000		1,285,750
Prothrombinex		757,500			757,500					
Xyntha	12,127,750	40,594,750	136,000	307,000	53,165,500	253,250	17,729,500	268,000		18,250,750
*NovoSeven (mgs)	6,974	3,887		8	10,869	61	4,433	759		5,253
FEIBA	1,702,500	71,000	552,500		2,326,000		1,273,000	29,000		1,302,000
<b>HMB (IUs)</b>	<b>8,365,500</b>	<b>10,759,000</b>	<b>447,000</b>	<b>346,000</b>	<b>19,917,500</b>	<b>614,000</b>	<b>5,761,000</b>			<b>6,375,000</b>
BeneFIX	7,975,500	10,266,000		343,000	18,584,500	614,000	5,681,000			6,295,000
MonoFIX	164,000	57,000	447,000		668,000					
Rixubis	226,000	376,000		3,000	605,000		80,000			80,000
Xyntha		60,000			60,000					
*NovoSeven (mgs)	943	886			1,829					
<b>VWD (IUs)</b>	<b>2,269,000</b>	<b>2,387,750</b>		<b>149,000</b>	<b>4,805,750</b>	<b>147,250</b>	<b>874,500</b>	<b>72,000</b>	<b>5,250</b>	<b>1,099,000</b>
Advate						500				500
Biostate	2,269,000	2,387,750		149,000	4,805,750	146,750	874,500	72,000	5,250	1,098,500

\* The total in this table combines the values for patients with mild, moderate and severe conditions. The severity of a patient's condition is not always known at initial presentation. This table includes product issues to patients with unknown/not specified treatment regimens. All products listed above are in IUs unless stated.

\*\*IUs sums all the products except NovoSeven

TABLE 20 - VOLUME (IU) OF PRODUCTS ISSUED IN 2015-16 BY TREATMENT REGIMEN – OTHER DIAGNOSES

	Adult				Paediatric			
	On Demand	Prophylaxis	Not specified	Adult Total *	On Demand	Prophylaxis	Not specified	Paediatric Total *
<b>Other Factor Deficiency</b>								
Biostate	9,000				9,000			
Prothrombinex - VF		80,000			80,000		26,500	
Fibrogammin	97,000	28,500			125,500	1,250	82,000	
Factor X P Behring							3,242	
Factor XI bpl	4,313			5,101	9,414	5,672		1
*NovoSeven (mgs)	20	270		4	294		177	
<b>Platelet Disorder</b>								
*NovoSeven (mgs)	762				762	7		
<b>Fibrinogen</b>					<b>204</b>	<b>5</b>	<b>60</b>	
Human Fibrinogen RiaSTAP (gms)	86	118			204	5	60	
<b>Other</b>								
Biostate	3,000				3,000			
Ceprotrin		192,000			192,000			
Human Fibrinogen RiaSTAP (gms)				6	6			4
*NovoSeven (mgs)				312	312			

\* The total in this table combines the values for patients with mild, moderate and severe conditions. The severity of a patient's condition is not always known at initial presentation. This table includes product issues to patients with unknown/not specified treatment regimens. All products listed above are in IUs unless stated.



TABLE 21 - NUMBER OF PATIENTS FOR HMA, HMB AND VWD BY STATE

	Number of Patients who received product during the year								
	ACT	NSW	NT	QLD	SA	TAS	VIC	WA	Total
<b>HMA</b>									
Advate	20	180	<5	141	89	11	90	44	<580
Biostate		21		14	<5	<5	7	<5	<57
FEIBA	<5	7		6	<5	<5	5	<5	<38
Kogenate FS	<5	<5	<5	<5				<5	<25
NovoSeven		<5	<5	14	8	<5	15	<5	<57
Prothrombinex				<5					<5
Xyntha	<5	104	<5	48	26	11	109	60	<368
<b>HMB</b>									
BeneFIX	<5	62		57	17	5	46	18	<210
MonoFIX	<5	<5		<5			<5	<5	<25
NovoSeven		<5					<5		<10
Rixubis		<5			<5		<5	<5	<20
Xyntha		<5							<5
<b>VWD</b>									
Advate							<5		<5
Biostate	8	73	<5	51	19	6	30	44	<236

\* The total in this table combines the values for patients with mild, moderate and severe conditions. The severity of a patient's condition is not always known at initial presentation. This table includes product issues to patients with unknown/not specified treatment regimens.

\*\* The Totals are distinct counts of Patients who received product and may be counted more than once under each state as they received more than one product throughout the year.

TABLE 22 - VOLUME OF PRODUCT ISSUED FOR HMA, HMB AND VWD BY STATE

	Volume of Product Issued through the year								
	ACT	NSW	NT	QLD	SA	TAS	VIC	WA	Total
<b>HMA (IUs)†</b>	<b>1,573,500</b>	<b>56,125,250</b>	<b>706,750</b>	<b>36,067,250</b>	<b>16,053,500</b>	<b>4,645,500</b>	<b>27,305,300</b>	<b>17,733,000</b>	<b>160,210,050</b>
Advate	1,040,500	27,372,750	586,000	18,159,250	9,888,500	1,315,250	10,442,550	4,554,000	73,358,800
Biostate		4,457,000		4,072,000	7,000	8,000	232,000	339,000	9,115,000
FEIBA	321,000	1,345,500		1,316,000	59,500	366,000	587,000	154,500	4,149,500
Kogenate FS	80,000	69,000	2,250	1,260,750				1,000	1,413,000
*NovoSeven (mgs)		728	14	9,484	1,090	1,313	4,963	2,216	19,808
Prothrombinex				757,500					757,500
Xyntha	132,000	22,881,000	118,500	10,501,750	6,098,500	2,956,250	16,043,750	12,684,500	71,416,250
<b>HMB (IUs)‡</b>	<b>611,000</b>	<b>12,159,250</b>		<b>5,280,750</b>	<b>1,888,000</b>	<b>685,000</b>	<b>4,334,000</b>	<b>1,353,000</b>	<b>26,311,000</b>
BeneFIX	164,000	11,899,250		5,251,750	1,512,000	685,000	4,206,000	1,180,000	24,898,000
MonoFIX	447,000	117,000		29,000			48,000	27,000	668,000
*NovoSeven (mgs)		886					943		1,829
Rixubis		83,000			376,000		80,000	146,000	685,000
Xyntha		60,000							60,000
<b>VWD (IUs)</b>	<b>90,750</b>	<b>3,208,500</b>	<b>11,000</b>	<b>1,180,000</b>	<b>329,750</b>	<b>28,250</b>	<b>308,000</b>	<b>856,500</b>	<b>6,012,750</b>
Advate							500		500
Biostate	90,750	3,208,500	11,000	1,180,000	329,750	28,250	307,500	856,500	6,012,250

\* The total in this table combines the values for patients with mild, moderate and severe conditions. The severity of a patient's condition is not always known at initial presentation. This table includes product issues to patients with unknown/not specified treatment regimens. All products listed above are in IUs unless stated.

\*\*IUs sums all the products except NovoSeven

TABLE 23 - VOLUME, PATIENT COUNTS AND IU OR MG/KG/YEAR OF PRODUCTS ISSUED IN 2015-16 BY TREATMENT REGIMEN - ACQUIRED

	Adult				
	On Demand	Not specified	Adult Total *	Patient Counts	IU or mg/kg/Year
<b>HMA</b>					
Advate	44,000		44,000	<5	490
Biostate	65,000	15,000	80,000	<5	762
*NovoSeven (mgs)	2,465	1,221	3,686	7	26
FEIBA	412,500	109,000	521,500	5	4,580
<b>HMB</b>					
BeneFIX		18,500	18,500	<5	2,000
<b>VWD</b>					
Biostate	71,500	36,500	108,000	7	855

\* The total in this table combines the values for patients with mild, moderate and severe conditions. The severity of a patient's condition is not always known at initial presentation. This table includes product issues to patients with unknown/not specified treatment regimens. All products listed above are in IUs unless stated.

\*\*IUs sums all the products except NovoSeven

TABLE 24 - IU VOLUME OF PRODUCT ISSUED AND PATIENT COUNTS FOR HEREDITARY HMA AND HMB BY SEVERITY AND REGIMEN TYPE

Severity	Regimen type	Haemophilia A		Haemophilia B	
		Total IUs	Number of patients	Total IUs	Number of patients
Adult - Mild	On demand	3,535,050	182	1,453,000	45
	Prophylaxis	560,000	6	72,000	<5
Adult - Moderate	On demand	5,780,000	68	2,310,500	41
	Prophylaxis	6,928,500	26	3,824,000	13
	Tolerisation	120,000	<5		
Adult - Severe	On demand	19,227,250	102	4,598,000	24
	Prophylaxis	69,014,325	241	6,863,000	26
	Tolerisation	1,421,000	<5	447,000	<5
<b>Adult - Total</b>		<b>106,586,125</b>	<b>&lt;635</b>	<b>19,567,500</b>	<b>&lt;159</b>
Paediatric - Mild	On demand	339,250	43	130,750	11
	Prophylaxis	639,250	6	189,500	<5
Paediatric - Moderate	On demand	392,750	35	397,500	9
	Prophylaxis	4,218,000	25	996,750	7
Paediatric - Severe	On demand	410,493	24	85,750	6
	Prophylaxis	39,586,750	224	4,574,750	33
	Tolerisation	3,448,250	14		
<b>Paediatric - Total</b>		<b>49,034,743</b>	<b>371</b>	<b>6,375,000</b>	<b>&lt;71</b>

\* Values in this table exclude products issued to patients with unknown severity classification or treatment regimen, so they will vary from those figures shown previously.

\*\*Patients may receive more than one regimen type and may therefore be counted multiple times.

TABLE 25 - VOLUME OF PRODUCT ISSUED AND PATIENT COUNTS FOR HEREDITARY HMA, HMB AND VWD BY REGIMEN TYPE AND PRODUCT

Bleeding Disorder	Paediatric / Adult	Regimen type	Advate		BeneFIX		Biostate		FEIBA		Kogenate	
			Total IUs	Number of patients	Total IUs	Number of patients	Total IUs	Number of patients	Total Units	Number of patients	Total IUs	Number of patients
Haemophilia A	Adult	On demand	15,219,050	246			1,098,500	20	1,702,500	11	101,000	<5
		Prophylaxis	32,900,000	120			1,805,500	6	71,000	<5	26,250	<5
		Tolerisation	120,000	<5			1,285,000	<5	552,500	<5		
	Paediatric	On demand	868,500	73			13,000	<5			7,500	<5
		Prophylaxis	22,560,000	138			3,446,250	11	1,273,000	6	708,250	<5
		Tolerisation	1,246,250	8			1,364,000	5	29,000	<5	570,000	<5
	<b>Total</b>		<b>72,913,800</b>	<b>&lt;590</b>			<b>9,012,250</b>	<b>&lt;52</b>	<b>3,628,000</b>	<b>&lt;32</b>	<b>1,413,000</b>	<b>&lt;25</b>
Haemophilia B	Adult	On demand			7,975,500	104						
		Prophylaxis			10,266,000	39						
		Tolerisation										
	Paediatric	On demand			614,000	26						
		Prophylaxis			5,681,000	41						
	<b>Total</b>				<b>24,536,500</b>	<b>210</b>						
Von Willebrand Disease	Adult	On demand					2,269,000	151				
		Prophylaxis					2,387,750	12				
	Paediatric	On demand	500	<5			146,750	38				
		Prophylaxis					874,500	7				
		Tolerisation					72,000	<5				
	<b>Total</b>		<b>500</b>	<b>&lt;5</b>			<b>5,750,000</b>	<b>&lt;213</b>				

\*Values in this table exclude products issued to patients with unknown treatment regimen, so they will vary from those figures shown previously.

\*\*Patients may receive more than one regimen type and may therefore be counted multiple times.

TABLE 25 CONTINUED - VOLUME OF PRODUCT ISSUED AND PATIENT COUNTS FOR HEREDITARY HMA, HMB AND VWD BY REGIMEN TYPE AND PRODUCT

Bleeding Disorder	Paediatric / Adult	Regimen type	MonoFIX - VF		NovoSeven		Prothrombinex - VF		Rixubis		Xyntha		
			Total IUs	Number of patients	Total mgs	Number of patients	Total IUs	Number of patients	Total IUs	Number of patients	Total IUs	Number of patients	
Haemophilia A	Adult	On demand			6,974	24					12,127,750	95	
		Prophylaxis			3,887	<5	757,500	<5			40,594,750	147	
		Tolerisation									136,000	<5	
	Paediatric	On demand			61	<5					253,250	25	
		Prophylaxis			4,433	6					17,729,500	110	
		Tolerisation			759	5					268,000	<5	
	<b>Total</b>					<b>16,114</b>	<b>&lt;55</b>	<b>757,500</b>	<b>&lt;5</b>		<b>71,109,250</b>	<b>&lt;392</b>	
	Haemophilia B	Adult	On demand	164,000	5	943	<5			226,000	<5		
			Prophylaxis	57,000	<5	886	<5			376,000	<5	60,000	<5
Tolerisation			447,000	<5									
Paediatric		On demand											
		Prophylaxis							80,000	<5			
<b>Total</b>			<b>668,000</b>	<b>&lt;15</b>	<b>1,829</b>	<b>&lt;10</b>			<b>682,000</b>	<b>&lt;15</b>	<b>60,000</b>	<b>&lt;5</b>	

\*Values in this table exclude products issued to patients with unknown treatment regimen, so they will vary from those figures shown previously.

\*\*Patients may receive more than one regimen type and may therefore be counted multiple times.

# Appendix A Characteristics of Rare Clotting Factor Deficiencies

TABLE 26 - CHARACTERISTICS OF RARE CLOTTING FACTOR DEFICIENCIES

Missing Factor	Incidence*	Inheritance	Severity of Bleeding	Treatment
Factor I Afibrinogenemia Hypofibrinogenemia Dysfibrinogenemia	5 in 10 million not available 1 in 1 million	Autosomal recessive Recessive or dominant Recessive or dominant	Usually mild, except in afibrinogenemia	<ul style="list-style-type: none"> <li>•Fibrinogen conc. (Not funded in Australia)</li> <li>•Cryoprecipitate</li> <li>•Fresh frozen plasma</li> </ul>
Factor II	1 in 2 million	Autosomal recessive	Moderate to severe when factor levels are low; usually mild	<ul style="list-style-type: none"> <li>•Prothrombin complex conc.</li> <li>•Fresh frozen plasma</li> </ul>
Factor V	1 in 1 million	Autosomal recessive	Moderate to severe when factor levels are low; usually mild	<ul style="list-style-type: none"> <li>•Fresh frozen plasma</li> </ul>
Combined Factor V and Factor VIII	1 in 1 million†	Autosomal recessive‡	Usually mild	<ul style="list-style-type: none"> <li>•Fresh frozen plasma</li> <li>•Factor VIII conc.</li> <li>•Desmopressin</li> </ul>
Factor VII	1 in 500,000	Autosomal recessive	Severe when factor levels are low	<ul style="list-style-type: none"> <li>•Recombinant Factor VIIa conc.</li> <li>•Factor VII conc.</li> <li>•Fresh frozen plasma</li> </ul>
Factor X	1 in 1 million	Autosomal recessive	Moderate to severe when factor levels are low	<ul style="list-style-type: none"> <li>•Prothrombin complex conc.</li> <li>•Fresh frozen plasma</li> </ul>
Combined deficiency of vitamin K-dependent clotting factors	not available	Autosomal recessive	Usually mild, but a few families have reported very low levels and more severe symptoms	<ul style="list-style-type: none"> <li>•Vitamin K</li> <li>•Prothrombin complex conc.</li> <li>•Fresh frozen plasma</li> </ul>
Factor XI	1 in 100,000	Recessive or dominant	Mild to moderate when factor levels are low	<ul style="list-style-type: none"> <li>•Factor XI concentrate</li> <li>•Antifibrinolytic drugs</li> <li>•Fibrin glue</li> <li>•Fresh frozen plasma</li> </ul>
Factor XIII	1 in 3 million	Autosomal recessive	Moderate to severe when factor levels are low	<ul style="list-style-type: none"> <li>•Factor XIII conc.</li> <li>•Cryoprecipitate</li> <li>•Fresh frozen plasma</li> </ul>

Note: Australian Prothrombin Complex Concentrate is not used for FVII deficiency

\* Estimates only

† 1 in 100,000 in some populations, including Israel, Iran, and Italy

‡ Very rarely, Factor VIII deficiency can be inherited separately from only one parent

# Appendix B Haemophilia Treatment Centres

## THE OBJECTIVES OF HTCS

Haemophilia Treatment Centres provide comprehensive care for people with haemophilia. Their roles include:

- Compilation and distribution of guidelines for best practice directed toward optimal care of patients with disorders of haemostasis
- Providing protocols for the accurate diagnosis of patients with bleeding disorders
- Providing protocols for the regular review of infectious disease markers in patients and their families
- The allocation and distribution of therapeutic blood and recombinant products together with advice regarding the use of blood and recombinant products, at a state and national level
- The establishment of review programs to assess outcomes of therapies
- Provision of regularly updated data to the national Haemophilia Registry (ABDR)
- Participation in basic and clinical research

## OPERATING CONCEPT

Haemophilia Treatment Centres coordinate and, where possible, integrate patient care, research and education to provide the optimal use of expertise and resources within hospitals and the community. One collaborative centre for each state and territory may suffice but this must include adult and paediatric type centres.

Haemophilia Centres provide:

- a single point accountability for the care of patients with bleeding disorders with responsibility for the coordination, allocation and distribution of therapeutic resources for the treatment of patients, i.e. coagulation products derived either from blood donors or recombinant technologies
- a clinical service by experienced staff for patients with bleeding disorders and their families at short notice at any time of the day or night
- organisation of home therapy programs by the centre or in collaboration with other haemophilia treatment facilities
- a counselling and advisory service for people with haemophilia and their families including genetic counselling and family planning
- specialist medical expertise, principally haematology, surgery (the surgeons would have to be accredited to the Haemophilia Centre) rheumatology, infectious diseases and dental services
- specialist allied health services to include physiotherapy, social work and podiatry
- a laboratory service able to carry out all investigations required for the accurate diagnosis of haemophilia and other inherited disorders of haemostasis and to have access, in association with other centres, to specialised testing facilities, for example gene typing
- a system of record for all investigations, treatments, allocation of therapeutic products and adverse reactions
- a capability to participate in research including clinical trials
- educational programs for medical staff, other personnel, patients and their families which promote care of patients with disorders of haemostasis



- an outreach service to isolated patients and treating medical services. The outreach service may include:-
  - A haemophilia treatment facility located in a hospital that does not provide all the specialist services
  - Designated supervising medical practitioner
- data management to facilitate the use of an information system database, such as the Australian Bleeding Disorder Registry, used in the clinical environment to aid in the capturing of data critical to HTC staff for the day to day management of people with bleeding disorders and for supply management and policy purposes

All isolated patients (where care is managed in an outreach program) should be registered at, and be reviewed regularly by, a Haemophilia Treatment Centre which would arrange delivery of and monitor the supply of therapeutic coagulation products.

The HTC must maintain on-going dialogue with the client group in each state and territory. The role of State and Territory Governments is to designate 'Haemophilia Treatment Centres' and negotiate the funding of the HTC including the purchase of therapeutic blood and recombinant products for distribution within states (or regions) and territories. In some states committees have been established to consider and schedule elective surgery.

## DATA QUALITY OF HTC DATA COLLECTIONS

The following organisations are represented at various HTCs nationally:

- Australian Haemophilia Nurses Group (AHNG)
- Australia/New Zealand Haemophilia Social Workers' and Counsellors' Group (ANZHSWCG)
- Australia/New Zealand Physiotherapist Group (ANZHPG)
- Haemophilia Foundation of Australia (HFA)

These member representatives have provided input into the initial design of the ABDR and continue to provide input from their respective areas of speciality.

The Data Managers at each HTC are members of the Data Managers' Group (DMG). DMG Co-Chairs are elected and coordinate teleconferences, between all Data Managers, on a regular basis. The DMG Co-Chairs also have the functionality of raising issues, to the NBA, on behalf of their group. AHCDO has a major role in providing support to ABDR Data Managers through the funded model for Data Managers.

The advantages of this model of Haemophilia Data Co-ordination are:

- Accurate and complete data entry
- Dedicated and focused data management
- Regular reporting and analysis of collated information
- New product initiation of unresolved haemophilia care related questions
- Clinical audit of current policies and monitoring of agreed national standards

A number of ongoing data quality initiatives were first implemented in 2010-11, including:

- Regular teleconferences for ABDR DMG
- 'Advanced Search' functionality of the ABDR whereby Data Managers are able to extract information from the ABDR on an ad hoc basis
- Reviews of data definitions undertaken by DMG Co Chairs
- NBA financial support, through AHCDO funding, for HTC Data Managers
- The ABDR Update is a functional tool in the form of a Newsletter. This provides an update on issues such as changes to the ABDR and functionality enhancements. This update is a means of keeping all ABDR stakeholders informed.

Comprehensive automated and manual data cleansing and validation processes that occurred as part of the 4th Generation ABDR Redevelopment project released in August 2012 enhanced the ABDR data accuracy and consistency presented in this report. The 4th Generation ABDR was successfully implemented on 13 August 2012.

However, there are still some data quality issues that impact the data presented in this report. Some post migration tasks for Data Managers to clean the data include

- Verify patients with more than one diagnosis
- Duplicate diagnoses to be deleted and Inhibitor Tests to be combined under the persisting diagnosis
- Verify severity ratings and treatment regimens for some patient records
- There are also a number of low level data verification activities

## LIST OF HTCS

TABLE 27 - HAEMOPHILIA TREATMENT CENTRES

Hospital	Haemophilia Treatment Centre	State
The Canberra Hospital	Haemophilia Clinic	ACT
Calvary Mater Newcastle	Haemophilia Treatment Centre	NSW
Royal Prince Alfred Hospital	Haemophilia Treatment Centre	NSW
Sydney Children's Hospital	Centre for Children's Cancer and Blood Disorders	NSW
The Children's Hospital at Westmead	Haemophilia Treatment Centre	NSW
Prince of Wales Hospital	Bleeding Disorders Clinic	NSW
Westmead Hospital	Bleeding Disorders Clinic	NSW
Royal Darwin Hospital	Haemophilia Treatment Centre	NT
Royal Brisbane and Women's Hospital	Queensland Haemophilia Centre	QLD
Lady Cilento Children's Hospital	Queensland Haemophilia Centre Child and Adolescent Service	QLD
Royal Adelaide Hospital	South Australia Haemophilia Treatment Centre	SA
Women's and Children's Hospital	South Australia Haemophilia Treatment Centre	SA
Royal Hobart Hospital	Tasmanian Haemophilia Treatment Centre	TAS
The Alfred Hospital	Ronald Sawyers Haemophilia Centre	VIC
Royal Children's Hospital	Henry Ekert Haemophilia Treatment Centre	VIC
Princess Margaret Hospital	Paediatric Haemophilia Centre	WA
Hollywood Private Hospital	Hollywood Hospital Haemophilia Treatment Centre	WA
Fiona Stanley Hospital	Adult Haemophilia Centre	WA

# Appendix C National Supply of Products

It is the responsibility of the NBA to manage the national blood supply to ensure that healthcare providers have sustainable, reliable and efficient access to blood and blood products needed for patient care. NBA ensures blood supply security by working with states and territories to determine and manage an annual supply plan and budget and negotiating and managing blood supply contracts and arrangements with local and overseas suppliers.

## NATIONAL SUPPLY PLAN AND BUDGET

A key element of the NBA's role in ensuring security of supply is to develop, coordinate and monitor the annual national supply plan and budget, including obtaining annual approval from health ministers.

This is achieved by:

- developing a national estimate of product demand
- liaising with jurisdictions and stakeholders to refine the estimated demand for products
- collecting and distributing data on product issued and reporting variations to jurisdictions on the approved supply plan
- intensively managing products if they are in short supply

Figure 15 illustrates the national supply by product category for 2015-16, and shows issues of clotting factor products was 15% (\$165.0 million).

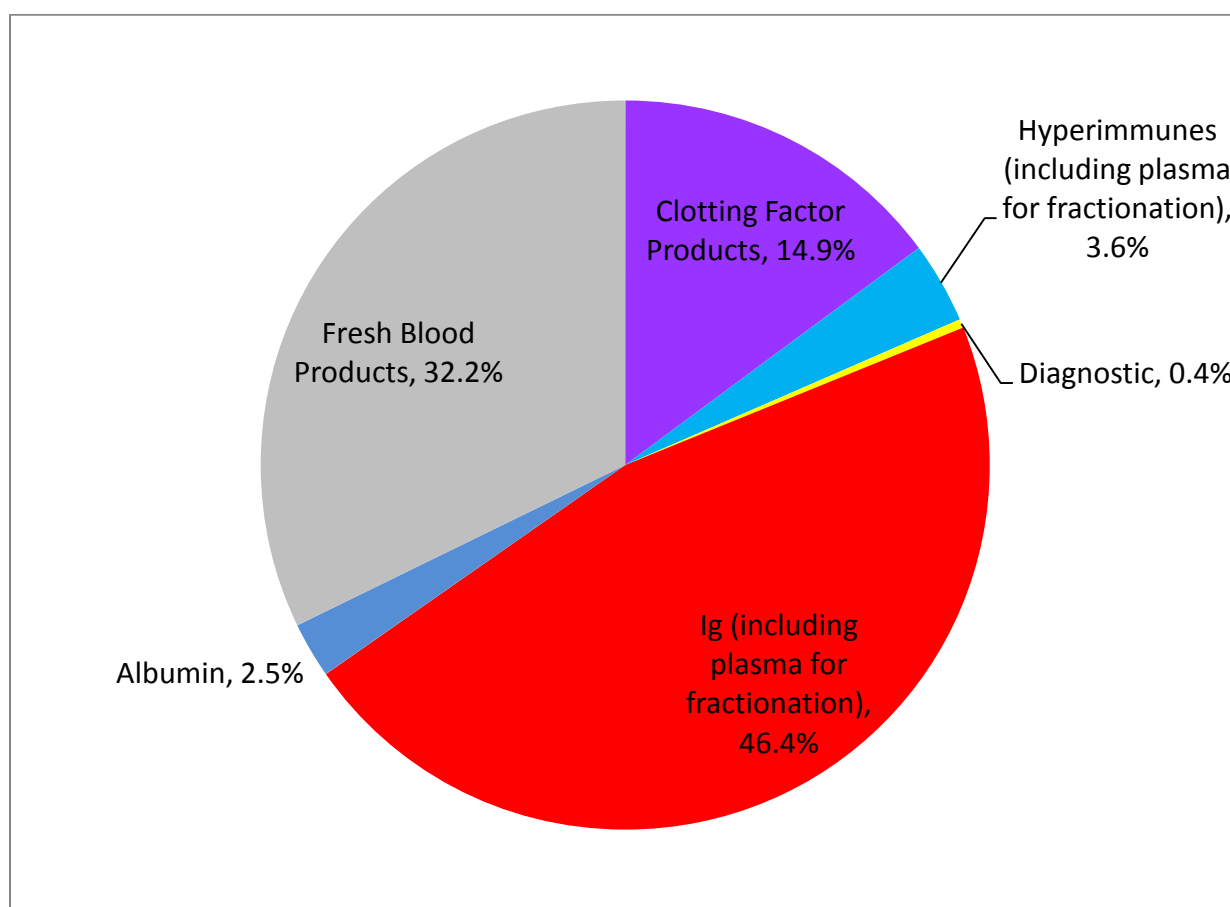


FIGURE 15 - NATIONAL ISSUES BY PRODUCT CATEGORY 2015-16

Note: Plasma for Fractionation costs paid to the Blood Service for collection has been attributed to IVIg and Hyperimmunes.

Throughout 2015–16, products were supplied to meet clinical demand and supply risks were effectively managed. The approved budget for 2015–16 covering the supply and management of blood and blood products and services under contract was \$1,166.40 million, comprising \$627.89 million for fresh blood products and plasma collection and \$520.33 million for plasma and recombinant products. The remaining \$18.18 million included items such as support for the publication of PBM Guidelines, maintenance of the Australian Haemophilia Centre Directors' Organisation (AHCDO) and administration of the Australian Bleeding Disorders Registry (ABDR).

## ISSUES OF CLOTTING FACTORS

Issues of clotting factor products represent those deliveries from suppliers to all Australian Health Providers, including hospitals and Haemophilia Treatment Centres.

Figure 16 indicates that the demand for Factor VIII products increased by 5.0 per cent when compared to 2014-15. The relative proportion of recombinant versus plasma derived product remains stable. Plasma derived Factor VIII is an important alternative for immune tolerisation therapy and von Willebrand disease (vWD). The demand for recombinant Factor VIII increased by 5.2 per cent over 2014-15. Plasma derived Factor VIII demand increased by 3.1 per cent.

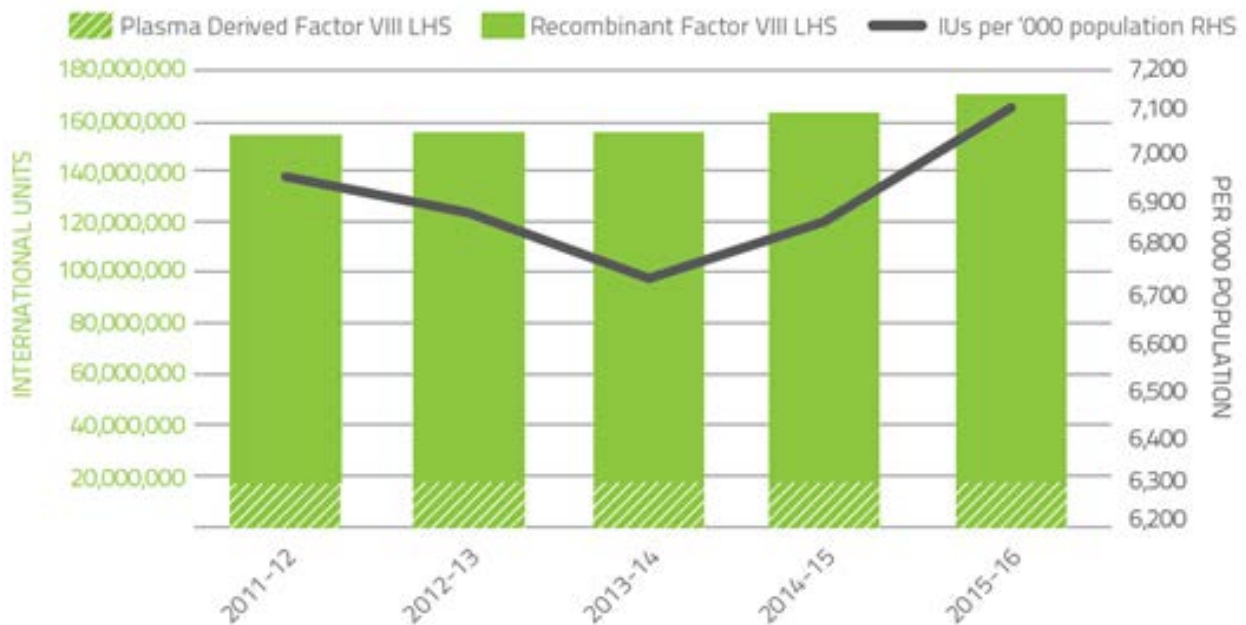


FIGURE 16 - ISSUES OF FACTOR VIII PRODUCTS, 2011-12 TO 2015-16

Figure 17 indicates that demand for Factor IX products in 2015-16 increased by 2.7 per cent compared to 2014-15. Plasma derived Factor IX demand decreased by 61.4 per cent in 2015-16 due to a reduction in specific patient requirements. Demand for Recombinant Factor IX increased by 8.0 per cent in 2015-16. The increased demand was largely driven by increases in surgeries.

Patient participation in company clinical trials for Extended Half Life recombinant Factor VIII and Factor IX products continues to contribute to the variability of year-to-year product growth.

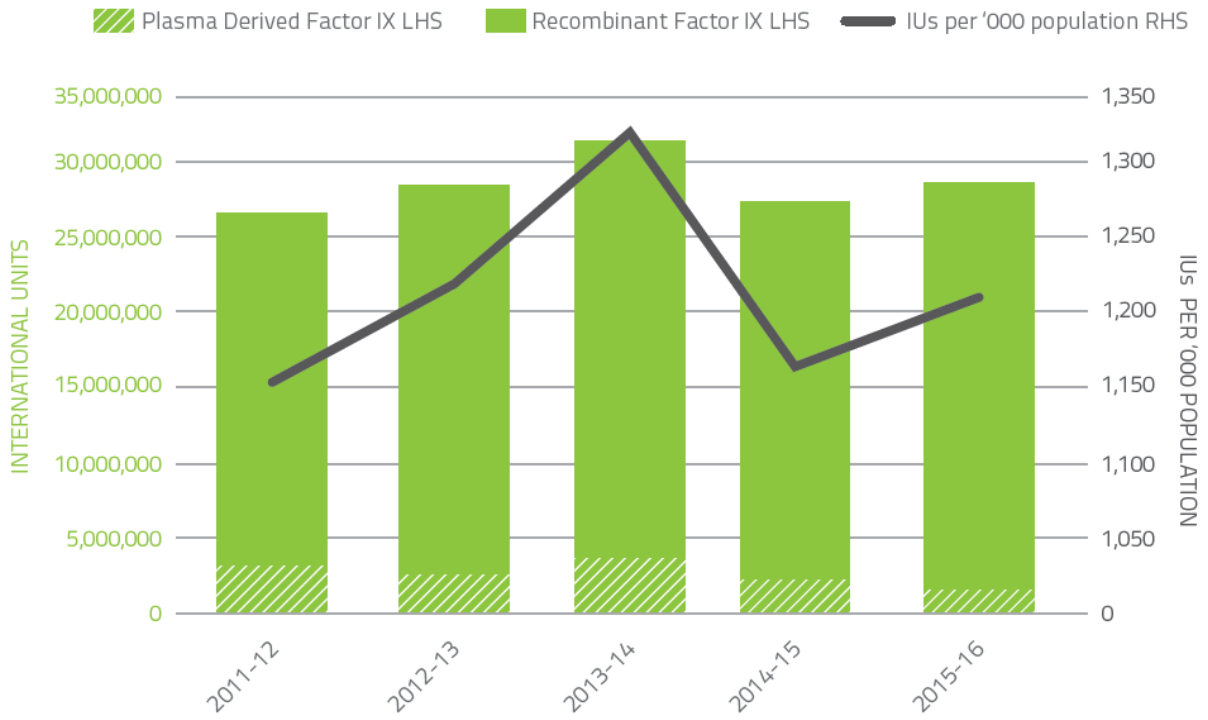


FIGURE 17 - ISSUES OF FACTOR IX PRODUCTS, 2011-12 TO 2015-16

Figure 18 and Figure 19 show demand for Recombinant Factor VIIa increased by 9.5 and 11.8 per cent for FEIBA compared to 2014-15. Demand for Recombinant Factor VIIa and FEIBA can change significantly from year to year as a result of the variable needs of a small number of patients.

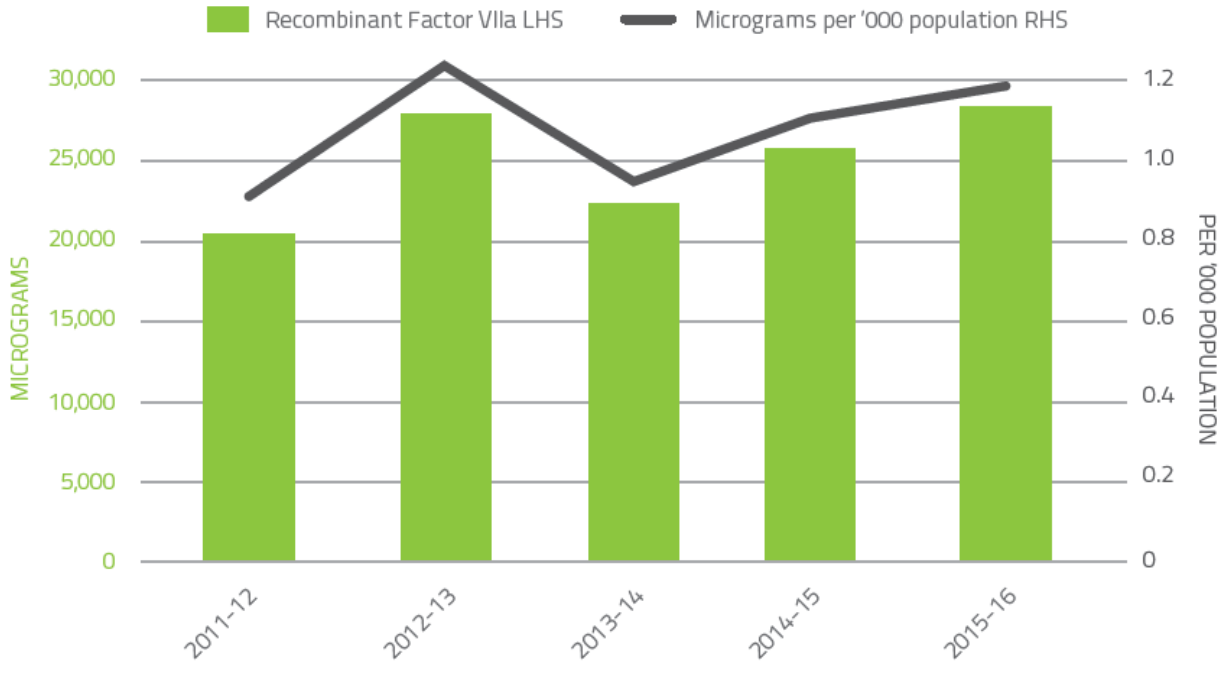


FIGURE 18 - ISSUES OF RECOMBINANT FACTOR VIIA PRODUCTS, 2011-12 TO 2015-16

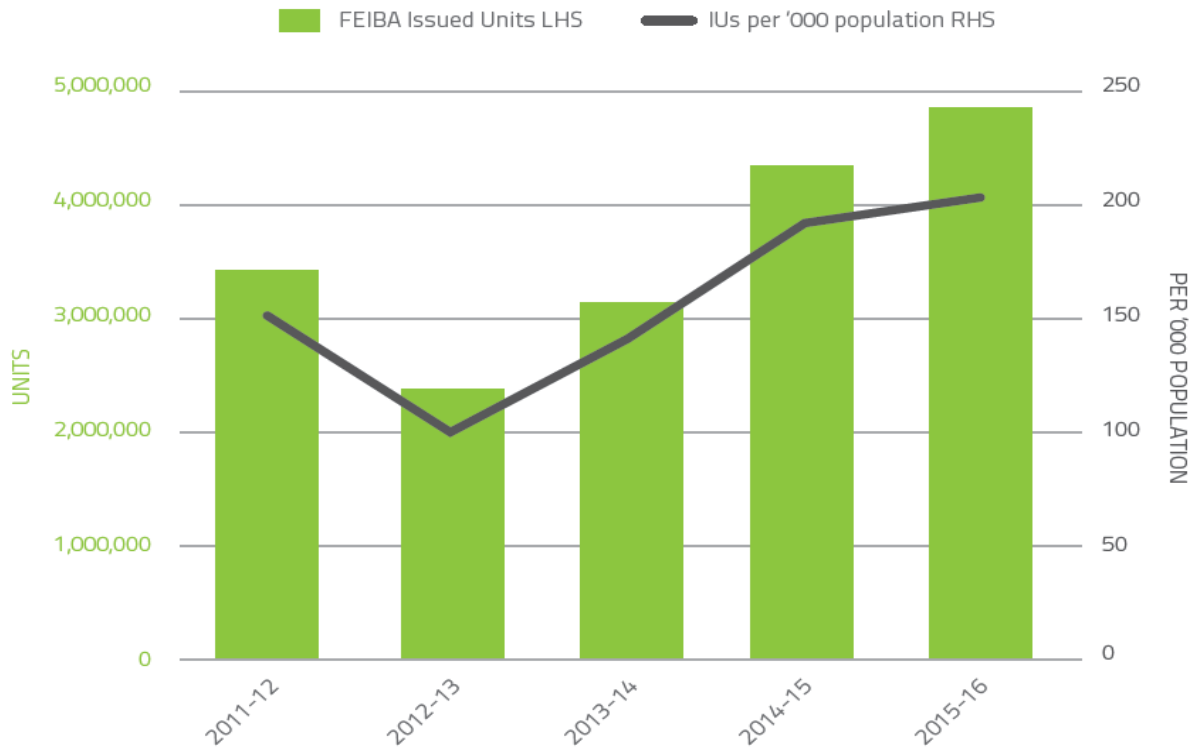


FIGURE 19 - ISSUES OF FEIBA, 2011-12 TO 2015-16

# Appendix D History of the ABDR

The ABDR was first established in 1988 using a 'Paradox' database at each Haemophilia Treatment Centre in Australia. The aims of the ABDR were to provide a clinical tool for improved management and national demographics of patients with haemophilia and other inherited bleeding disorders.

The first demographic Haemophilia registry was established by the Haemophilia Foundation of Australia (HFA), under auspices of the Medical Advisory Panel (MAP), in 1991 with an initial survey of Haemophilia Treatment Centres (HTC) established in Australia. Following on this initial survey the MAP took on responsibility for developing an ongoing registry and database associated with a University. The registry was based on a Paradox database with a comprehensive data collection including demographics, factor usage and bleed data. It was intended that software would be updated regularly by circulation of floppy disc updates and annual reports produced. Issues identified included no dedicated data entry staff, variability of IT support in institutions, unstable database requiring significant maintenance, time for data entry, and complexity. Unfortunately the registry did not progress.

In view of issues identified, in 2000 a new database using Access was developed with a single initial page collecting demographic and basic clinical data – 'medical registry'. Financial support was provided for data entry. Identification was by a code including multiple initials of name and date of birth as used by National HIV registries in Australia. Duplicate entries were identified and individual HTCs were asked to resolve differences based on activity of PWH and HTC. Initial demographics and diagnoses were provided for an annual report – initially to Department of Health and Aging, subsequently to National Blood Authority and presented at various forums. Data was vital for identifying product needs of the PWH community at a time of introduction of recombinant products. The ABDR achieved Quality Assurance status with Commonwealth to assist with concerns about privacy. Ongoing issues identified were related to privacy and data collection with one state not being involved and coverage of the database, as it appeared total product usage was not complete.

The National Blood Authority (NBA) was established in 2003 and in 2007 it was proposed to develop the ABDR further with a web based clinical registry. Funding from the NBA allowed updating of the database. Widespread consultation was undertaken with HTCs to draw up specifications for a clinical database. The project was tendered to a commercial provider to enable 'third party custody' of data. The ABDR was to be capable of ordering products in 'real time' at HTCs. Governance of the development and operation was by a steering committee consisting of Australian Haemophilia Centre Directors Organisation (AHCDO), HFA, NBA and jurisdictional representatives.

An internet-based, standardised data entry database involving all states was introduced in December 2008. But the database highlighted significant resource and IT issues in HTCs and hospitals with slow response and significant variation of practice within HTCs. This hampered complete data collection with lack of feedback to HTCs, inability to provide ad hoc reporting for HTCs and nationally available reports. Annual reports only provided broad information with NBA providing figures for factor usage. The commercial provider was unable to address these issues.

Issues with existing software and support by commercial provider necessitated a different approach. Further funding from the NBA enabled redevelopment of the ABDR using industry standard software in a 'Like for like' development. Data is now being held within NBA – requiring strict security protocols and separation of staff analysing data from those managing the system. Deficiencies of previous software were addressed with development of online reports to assist HTC management. Further expansion to include data from physiotherapy and social work, counselling pages and adverse events were developed. The 4th generation ABDR was released August 13, 2012.

The ABDR has evolved and improved with improvements in technology and feedback from stakeholders. In 2014 the ABDR entered a new phase with MyABDR – a smartphone application to enable patient input of bleed data and factor usage directly to the ABDR. The ABDR project has improved communication between HTC's for transfers and knowledge of 'travellers'.

The NBA delivered a number of updates and improvements to the Registry in 2014-15 to enhance the functionality and the user experience with MyABDR. The innovation delivered by the patient portal to ABDR, MyABDR, was recognised by the ICT industry through the receipt of two national iAwards merits in the Health and Government categories in August 2014 and through ITnews naming the NBA's Chief Information Officer as 'Healthcare CIO of the Year' in February 2015.

There has been further identification of PWHs and opportunity for standardisation of terminology. The ABDR is clinical tool to enable management external to the HTC eg outreach clinics. There is wide involvement of other professionals – nursing, physiotherapy, social workers/counselling. Adverse event reporting has commenced. Benchmarking between HTC's is possible with improvement in data recoding enabling opportunities for improvement.

## BENEFITS OF THE 4<sup>TH</sup> GENERATION ABDR

The NBA redeveloped the ABDR and deployed the 4th generation ABDR on August 13, 2012. It provides the following benefits:

- Single point of access for clinicians for treatment of patients
- Patient information relating to all clinical information associated with the treatment of haemophilia
- Information exchange between states and Haemophilia Treatment Centres
- National demographic information (age, gender etc.) of persons with bleeding disorders
- National data on inhibitor incidence and outcomes of treatment
- Allied health (physiotherapy and social work) monitoring and outcomes
- Recording of personal usage of factor replacement for clinical monitoring
- Data for forward planning and funding of factor concentrates on a national basis
- MyABDR is a secure app for smartphones and web site for people with bleeding disorders or parents/caregivers to record home treatments and bleeds. As an alternative, there is also a MyABDR paper-based treatment diary.

## CURRENT POSITION OF THE DEVELOPMENT OF THE ABDR

Today the Australian Bleeding Disorders Registry and MYABDR are fully operational. The ABDR Steering committee continues to oversee the project.

The National Blood Authority's role continues around provision of resources to maintain ABDR operations and to ensure timely and accurate reporting from the ABDR through provision of support to Data Managers. Data Managers, funded and supported by AHCD, are located at HTC's across Australia.



# Appendix E Patient Registration Form

PATIENT REGISTRATION FORM			
Clinician/Nurse to complete. Fields marked with an *asterisk are mandatory, optional fields are shaded grey.			
<input type="checkbox"/> New patient <input type="checkbox"/> Change of name <input type="checkbox"/> Change of address			
<b>Patient</b>			
ABDR ID <small>(Existing patients only)</small>	Title	Australian Resident Status <small>(Please tick)</small>	
		<input type="checkbox"/> Australian Citizen/Permanent Resident <input type="checkbox"/> Overseas Visitor <input type="checkbox"/> Temporary Visa	
*First name	Second name / Initial	*Family name	
Known as / Alias	*Gender	*Date of birth	Previous family name/s
	<input type="checkbox"/> Male <input type="checkbox"/> Female	/ /	
*Address		*Suburb	
1		*State	
2		*Postcode	
3		Country	
<input type="checkbox"/> Home phone	<input type="checkbox"/> Work phone	<input type="checkbox"/> Mobile	*Tick preferred contact method; at least one contact must be supplied.
<input type="checkbox"/> Home email	<input type="checkbox"/> Work email		
<b>Patient contact</b> <small>(mandatory if patient is under 18)</small>			
<input type="checkbox"/> Mother <input type="checkbox"/> Father <input type="checkbox"/> Spouse <input type="checkbox"/> Grandparent <input type="checkbox"/> Emergency <input type="checkbox"/> Other              Please specify: _____			
Title	First name	Second name / Initial	Last name
Address		Suburb	
1		State	
2		Postcode	
3		Country	
<input type="checkbox"/> Home phone	<input type="checkbox"/> Work phone	<input type="checkbox"/> Mobile	<input type="checkbox"/> Home email
<input type="checkbox"/> Work email    Tick best contact method			
Best contact number or email address _____			
<b>Diagnosis</b> <small>See overleaf for # options</small>			
*Date diagnosed	*Bleeding disorder #		
/ /			
*Severity	Baseline factor date	Baseline factor level	*Weight in kilograms
	/ /	%	
<small>Mild / Moderate / Severe / Unknown / Not applicable</small>	<small>(Where applicable)</small>	<small>(Where applicable)</small>	
<b>Treatment</b> <small>See overleaf for + ^ options</small>			
*Regimen +	*Product name ^	*Total dose	*Frequency
Comments _____			
<b>Attending Physician and Clinic / Hospital Address</b> <small>Missing data will be requested by an ABDR Data Manager.</small>			
*Title	*First name	*Last name	
*Name of Clinic / Hospital		*Best contact number or email address	
*Address		*Suburb	
1		*State	
2		*Postcode	
3			
<b>DECLARATION:</b>			
These details are true and correct at the time of completing this form. I have read the ABDR User Conditions and the Clinicians FAQ on the ABDR and I understand my role and obligations in populating the ABDR. The patient is also aware of the purpose for capturing their details in the ABDR and is aware of privacy and confidentiality protection arrangements as described overleaf. The ABDR Pamphlet has been given to patient.			
Name _____	Signature _____	Date / /	

When complete fax to your nearest Treatment Centre or Clinic – see [www.ahodo.org.au](http://www.ahodo.org.au) for details.

Effective November 2016.

### #Bleeding Disorder

Factor II deficiency (Prothrombin)  
 Factor V deficiency  
 Factor VII deficiency  
 Factor VIII deficiency (Haemophilia A)  
 Factor IX deficiency (Haemophilia B)  
 Factor X deficiency  
 Factor XI deficiency  
 Factor XII deficiency  
 Factor XIII deficiency  
 Symptomatic Carrier Factor VIII deficiency (Haemophilia A)  
 Symptomatic Carrier Factor IX deficiency (Haemophilia B)  
 Asymptomatic Carrier Factor VIII deficiency (Haemophilia A)  
 Asymptomatic Carrier Factor IX deficiency (Haemophilia B)  
 von Willebrand Disease Type 1  
 von Willebrand Disease Type 2 – Uncharacterised  
 von Willebrand Disease Type 2A  
 von Willebrand Disease Type 2B  
 von Willebrand Disease Type 2M  
 von Willebrand Disease Type 2N  
 von Willebrand Disease Type 3  
 von Willebrand Disease – Uncharacterised  
 Fibrinogen – Afibrinogenemia  
 Fibrinogen – Hypofibrinogenemia  
 Fibrinogen – Dysfibrinogenemia  
 Fibrinogen dysfunction – Uncharacterised  
 Platelet – Glanzmann's thrombasthenia  
 Platelet – Bernard-Soulier  
 Platelet – May Hegglin  
 Platelet – Macrothrombocytopenias  
 Platelet – Storage pool (dense granule) deficiency  
 Platelet – Primary secretion defect  
 Platelet – Uncharacterised  
 Acquired factor VIII inhibitor (Acquired Haemophilia A)  
 Acquired von Willebrand's Disease  
 Vascular disorders – Ehlers Danlos Syndrome  
 Vascular disorders – Uncharacterised  
 Other, please specify

### +Treatment Regimen

On demand  
 Prophylaxis  
 Tolerisation  
 Secondary Prophylaxis

### ^Product Name (Type)

Advate® (rFVIII)  
 BeneFIX® (rFIX)  
 Biostate® (pdFVIII)  
 Ceprotin® (Protein C)  
 Cryoprecipitate  
 DDAVP (Synthetic hormone)  
 Factor Eight Inhibitor Bypass Agent (FEIBA®) (Bypassing Agent)  
 Factor VII Concentrate® (pdFVII)  
 Factor XI bpl® (pdFXI)  
 Factor XI LFB Hemoleven® (pdFXI)  
 Fibrogammin P® (pdFXIII)  
 Fresh Frozen Plasma (FFP)  
 Haemocompletan P 1g (pdFXIII)  
 Intravenous Immunoglobulin (IVIg)  
 Kogenate (rFVIII)  
 Kogenate FS – Blood Service (rFVIII)  
 MonoFIX® - VF (pdFIX)  
 NovoSeven® (rFVIIa)  
 NovoSeven RT® (rFVIIa)  
 Platelets  
 Prothrombinex™ - VF (pdPCC)  
 Recombinate® (rFVIII)  
 ReFacto® (rFVIII)  
 Xyntha (rFVIII)  
 Xyntha Dual Chamber (rFVIII)

### ABDR Patient Pamphlet

**What is the ABDR?** The Australian Bleeding Disorders Registry (ABDR) is a database that collects all clinical information related to the treatment of people with bleeding disorders, like an electronic medical file. This includes information about patient diagnosis, treatment details, hospital admissions and administrative information as well as details on ordering, supply and use of clotting factor products. Information is entered into the ABDR by staff at haemophilia treatment centres. The ABDR is managed by the National Blood Authority. The ABDR was first established in 1988 and has been upgraded many times with the latest significant upgrade in 2012.

**Why do you need it?** The ABDR provides your health care team and support staff with a record enabling them to monitor and manage your treatment over time to improve your quality of life. Depersonalised information available from the ABDR may be used by authorised organisations to understand and improve treatment for bleeding disorders. The ABDR also provides governments with information on total clotting factor product requirements to make sure there is enough available to meet the needs of all Australians with bleeding disorders.

**What about privacy?** Only the health care team and support staff involved in providing medical services to you have access to your personal information. Other authorised users only have access to limited, depersonalised and/or summary information where all identifying information is removed to protect your privacy.

**Does information about me have to be included?** A minimum amount of information about you is required to ensure the continuous supply of clotting factor product is available to meet your treatment needs.

**Where can I get more information?** Further information about the ABDR can be obtained from the Australian Haemophilia Centre Directors' Organisation (AHCDO) on (03) 9885 1777, email [info@ahcdo.org.au](mailto:info@ahcdo.org.au) or visit [www.ahcdo.org.au](http://www.ahcdo.org.au)

#### Endorsement from Haemophilia Foundation Australia

Haemophilia Foundation Australia supports the ABDR. It helps doctors and other treating health professionals to understand more about the care and treatment needs of people affected by bleeding disorders. The ABDR will assist and guide planning to ensure treatment product is available when it is needed. We are confident that the steps in place will mean accurate, reliable and confidential data is available and that no patient details can be identified outside haemophilia centres.

[www.haemophilia.org.au](http://www.haemophilia.org.au)

#### Endorsement from Australian Haemophilia Centre Directors' Organisation

The ABDR is a valuable tool that provides an overview of those affected with haemophilia and other bleeding disorders in Australia. Data from the ABDR is the best information available for clinicians to advise governments making policy decisions regarding treatment needs and product availability.

National statistics available through the ABDR will give AHCDO an overview of practise and allow opportunities for improvement. This data can be pooled to compare Australian treatment standards with international benchmarks. The ABDR will continue to provide the ability to assess quality of life and other important clinical questions arising across Australia.

AHCDO's partnership on this initiative with the National Blood Authority, Haemophilia Foundation Australia and other specialist health professional groups is vital to the pursuit of excellence in clinical treatment practices.

[www.ahcdo.org.au](http://www.ahcdo.org.au)

Copies of this pamphlet can be obtained by contacting the National Blood Authority at [support@blood.gov.au](mailto:support@blood.gov.au) or 13 000 BLOOD (13 000 25663)

# Acronyms and glossary of terms

## ACRONYMS

ABDR	Australian Bleeding Disorders Registry
AHCDO	Australian Haemophilia Centres Directors' Organisation
BU (BU/ml)	Bethesda unit (expressed as Bethesda units per millilitre)
DDAVP	Desmopressin (1-desamino-8-D-arginine vasopressin; DDAVP) a derivative of the antidiuretic hormone, used to treat patients with von Willebrand disease. It does not come under the national blood agreement funding arrangements and its use is often not recorded in the NBA's issues database.
FEIBA	Factor VIII Inhibitor Bypassing Activity
FVIIa / rFVIIa	Factor VIIa (seven 'a') / Recombinant Factor VIIa
FVIII / rFVIII	Factor VIII (eight) / Recombinant Factor VIII
HFA	Haemophilia Foundation Australia
HMA	Haemophilia A (Factor VIII deficiency)
HMB	Haemophilia B (Factor IX deficiency)
HTC	Haemophilia Treatment Centre – A specialist centre at certain hospitals where comprehensive care is undertaken for people with haemophilia. Non HTCs are other hospitals who are encouraged to work with HTCs in their region.
IDMS	Integrated data management system – The NBA's integrated data management system.
IU	International Units
MyABDR	MyABDR is a secure app for smartphones (Android and iOS) and a <a href="#">web site</a> for people with bleeding disorders or parents/caregivers to record home treatments and bleeds.
NBA	National Blood Authority
OBD	Other bleeding disorders
PWH	People with Haemophilia
VWD	von Willebrand disease
WFH	World Federation of Hemophilia

## GLOSSARY OF TERMS

bleeding disorders	Diseases that cause abnormal or exaggerated bleeding and poor blood clotting
blood products	Products manufactured from donated blood
fractionation	Blood plasma fractionation refers to the general processes of separating the various components of blood plasma.



National Blood Authority  

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Australia