JPAC 11-10

Joint UKBTS / NIBSC Professional Advisory Committee ([1]) Summary Sheet

1. Paper for the JPAC meeting on:	10/3/2011
2. Date submitted:	21/1/2011
3. Title (including version no.):	Recommendations on Donor Height and Weight
4. Author(s):	Dr Sue Barnes on behalf of SAC Care and Selection of Donors
5. Brief summary:	Donors should not donate more than 15% of their blood volume in any one donation procedure (to include samples and other volume lost). Thus at current UK blood donation volumes, 450ml ± 10% plus 30-45ml in the diversion pouch, the donor should have an EBV of at least 3500ml calculated using the Nadler formula. Implementation of this change of policy should be applied to donors under 20 years of age in the first instance and supported by monitoring and regular review of adverse events in all donors. That the age group to which this deferral is applied is reviewed in one year with a view to extending this age group.
6. Action required by the Joint Professional Advisory Committee: (What do you want JPAC to do in response to this paper?) e.g. • endorse a specific recommendation • advise where there is a choice of possible actions • advise on priorities within the work plan • provide a steer on policy	Endorse recommendations to apply this criteria to the donor selection guidance for Whole Blood Donors
7. Any other relevant information:	

([1]) **J**oint **U**nited **K**ingdom **B**lood **T**ransfusion **S**ervices and **N**ational **I**nstitute for **B**iological **S**tandards and **C**ontrol **Professional Advisory Committee**

JPAC 11-10

Recommendations for changes to acceptance criteria for UK whole blood and component donors.

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1 Remit

The remit of this paper was to evaluate available evidence of the risk of accepting blood donors with low estimated blood volumes. I have **not** considered the need for any changes to existing legislation

2 Summary of recommendations

2.1 Following a review of available evidence outlined below we conclude that:

Donors should not donate more than 15% of their blood volume in any one donation procedure (to include samples and other volume lost). Thus at current UK blood donation volumes, 450ml ± 10% plus 30-45ml in the diversion pouch, the donor should have an EBV of at least 3500ml calculated using the Nadler formula.

2.3 Implementation of this change of policy should be applied to donors under 20 years of age in the first instance and supported by monitoring and regular review of adverse events in all donors. That the age group to which this deferral is applied is reviewed in one year with a view to extending this age group.

3 Background

The BSQR 2005 specifies a minimum donor weight for whole blood and component donors of 50kg [(1)]. This is based on an outdated assumption that Estimated Blood

Volume (EBV) is 70ml per kg and that therefore a donor of 50kg and above will have an EBV of at least 3500ml.

The current Council of Europe guidance[2] recommends that no more than 13% of estimated blood volume (EBV) be taken at any one donation, this recommendation is set to change in the next (16th) Edition to 15% of EBV. This is also the guidance as given in the Guidelines for the Blood Transfusion Services in the U.K Chapter 3 [3], (Appendix 1).

This more recent guidance is in line with standard medical practice. Grade 1 shock is defined as a loss of up to 15% EBV. This leads to a mild resting tachycardia which can be well tolerated in otherwise healthy individuals ([4, 5]) and is reversed by normal compensatory mechanisms within 24 hours. Grade 2 shock (15-30% loss of EBV) is clinically significant with tachycardia, narrow pulse pressure and significantly delayed capillary filling, with the sufferer looking and feeling unwell, anxious, thirsty etc. This condition usually requires fluid replacement to correct the condition.

To allow a current UK donation volume of 450ml ± 10% to be less than 15% of EBV the donor must have an EBV of 3500ml.

- Would only accepting donors with EBV of 3500ml decrease the incidence of adverse reactions?
- Should this restriction be applied to donors of both sexes and all ages or only younger donors?
- Approximately how many donations might be lost or gained?

4 Methods

Evidence was obtained from the following sources:

4.1 Review of haemovigilance data

4.1.1 American Red Cross and NHSBT data on donor adverse events

4.2 Review of key literature

4.2.1 The calculation of EBV

4.2.2 The relationship between EBV and the safety of donation

4.3 Demographic data

4.3.1 Blood volume estimates of the population in the UK

4.3.2 Age and sex distribution of NHSBT donors

4.3.3 Estimated number of lost and gained donors

4.4 Blood service data

4.4.1 Experience after implementing EBV deferral in the United States of America

5 Results

5.1 Review of haemovigilance data

5.1.2 American Red Cross and NHSBT data on donor adverse events

The data from the American Red Cross [6] looked at the effect of donor age on donor adverse events and demonstrates that in whole blood donors (Chart 5.1.1), younger whole blood donors were more likely to experience complications after donations than older whole blood donors. A similar pattern, although less marked, is seen in their apheresis donors (Chart 5.1.2), this difference is due to a very much reduced rate of vasovagal reactions in donors over 30 years of age.

A similar distribution of donor adverse events can be seen in donor adverse events reported by the NHSBT (Chart 5.1.3) which includes both whole blood and apheresis donors. As in the US data the difference is due to a higher incidence of fainting events (prefaint and actual faints) in younger donors. (Chart 5.1.4). The actual rate of fainting is significantly different in donors age <26 compared with older donors in NHSBT (E Curnow, NHSBT Statistical team).

5.2 Review of key literature

5.2.1 The calculation of Estimated Blood Volume (EBV)

Traditionally estimated blood volume has been based on weight alone using the formula 70ml/kg [4, 5]. However since the 1960s it has been clear that this formula give estimates that were convenient for the management of patients in the situation of hypovolaemic shock, but it is significantly inaccurate for large proportions of the population, particularly in obese individuals, because adipose tissue is relatively avascular, leading to high predicted normal values and low measured values. In view of these limitations, it has been proposed that EBV should be calculated from lean body mass (LBM). Unfortunately, there is no simple and accurate method for measuring LBM. Appreciating these difficulties and the limitation of ml/kg expressions, a number of authors, following measurements in normal population groups, have proposed formulae for the prediction of the EBV, or normal RCM and PV using both height and body weight.

The most commonly used formula in the UK and Europe is that proposed by Nadler et al in 1962 [7] This was derived from measurements of plasma volume (PV) and the red cell mass (RCM) was calculated from mean normal packed cell volumes (PCV). This formula:

EBV male (ml) = (366.9 H^3) + (32.19 W) + 604

EBV female (ml) = (356.1 H^3) + (33.08 W) + 183.3

(Where H= height in meters and W = weight in kg)

Is simple to apply and most of the research mentioned in this document use this formula. If required RCM and PV can be derived from this formula [8]:

RCM male = EBV x 0.47 x 0.91,

RCM female = EBV x 0.43 x 0.91,

and PV= EBV – RCM

A number of studies[9,10,11,and 12] have used either ^{51}Cr radiolabeled red blood cells or the more recent recommended methods for the measurement of red cell mass (RCM) and plasma volume (PV) which have been drawn up by the Radionuclide Panel of the International Committee for Standardization in Haematology (ICSH) [13]. In 1995, the ICSH expert panel reviewed these studies and the available formula and recommended the following formula[12] for use in Europe:

RCM male (ml) = (1486 x S) - 825

PV male (ml) = 1578 x S

RCM female (ml) = (1.06 x age) + (822 X S)

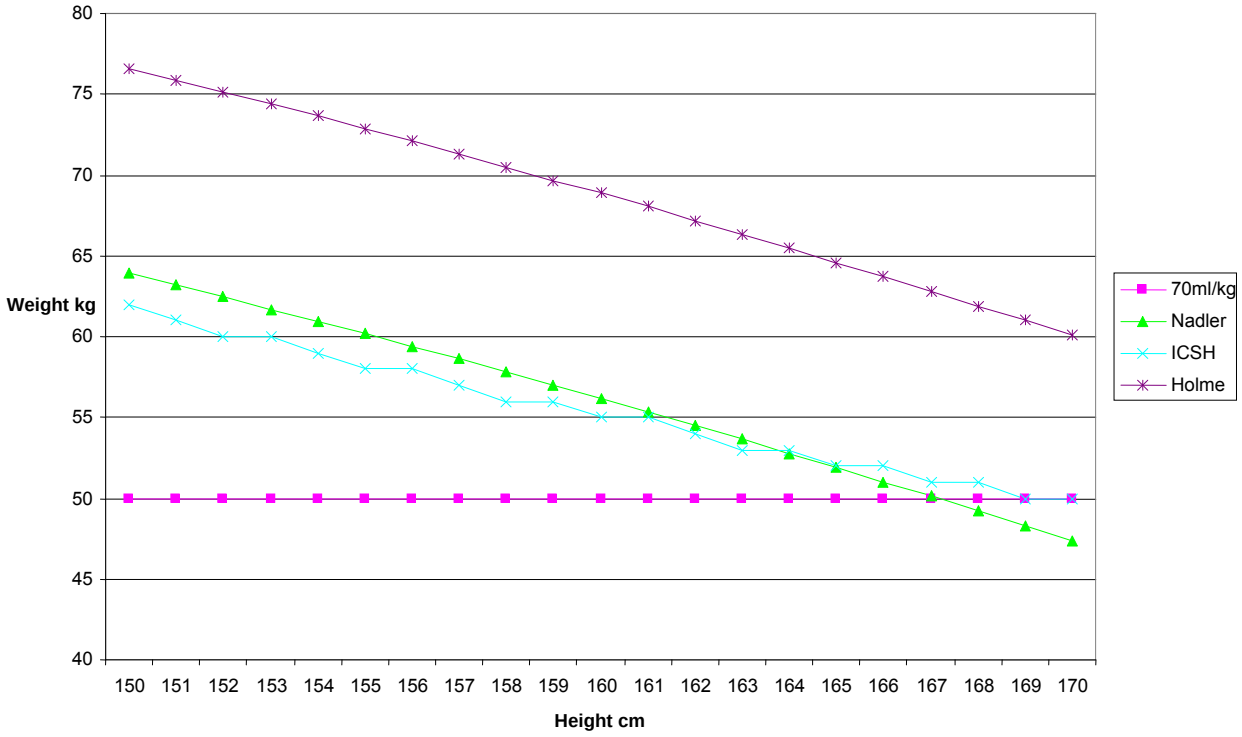
PV female (ml) = 1395x S

(Where S=surface area (m^2)= $W^{0.425}$ X $h^{0.725}$ X 0.007184 and

age = age (years); h = height (cm); W = weight (kg).)

The Council of Europe in the forthcoming 16th Edition of the Council of Europe Guidance recommends this formula for use. However, the resulting EBV is not very different from that derived from the Nadler formula as can be seen below.

Comparison of Height & Weight requirements for an EBV of 3,500ml using 4 different formulas



The ICSH formula is age dependant for female subjects, which makes it difficult to use in a nomogram form on a donor session.

In 2008 Holme et al [14] using a double radiolabel technique have estimated the RCM and derived a different formula, similar to that proposed by Hurley et al [8].The group reported that the formulas in current use may consistently overestimate the RCM and thus EBV of today's population (in the US). They felt this was likely to be the result of a shift in population characteristics over the last 4 decades particularly a raised body mass index that has not resulted in a proportionally increased blood volume.

Although the latter is probably equally true (albeit to a lesser extent) of the population in the UK and Europe, for the rest of the paper and for the purposes of calculation of donor's EBV the Nadler formula has been used. It is the easiest mathematically to manipulate, it is not age dependant and it is the one used in most literature on donor adverse events. Thus although there may be an overestimate of blood volume this same over estimate has been used consistently, here and in the published literature.

5.2.2 The relationship between EBV and the safety of donation

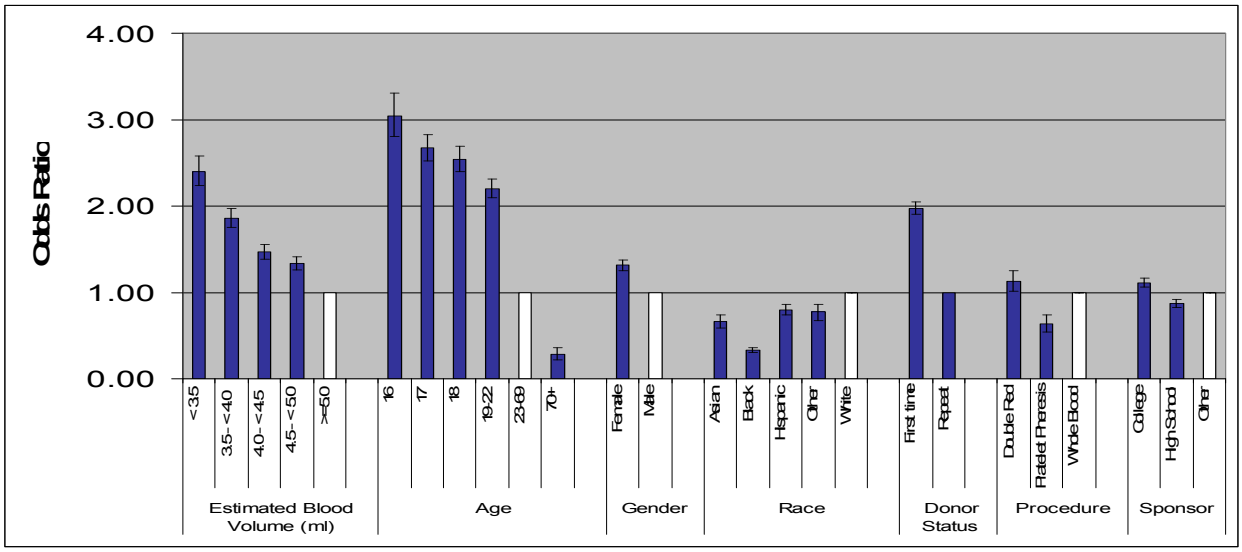
The review of donor haemovigilance data in the US[6, 15] and the data of NHS BT has highlighted the particular susceptibility of young donors to have faint type adverse reactions. Recognising the problem with fainting across all age groups and especially the younger donor NHSBT has introduced a number of measures to try to reduce the incidence. These include better predonation education, improved session environment, the ingestion of water just before donation, distraction and muscle tension techniques. Guidance on these have been added to the Red Book (Guidelines for the Blood Transfusion Services in the U.K) [3] for the forthcoming 8th edition.

A review of recent literature suggests that the strongest independent predictors of fainting events are a donor's estimated blood volume, the volume of donation and then donor age.

In an analysis of 422,231 whole blood donors across 16 BSI centres in the US, Wiltbank et al [16] noted that young and female donors were most at risk of faint and prefaint events and noted that the strongest predictor of this was EBV. If the donor had an EBV of less than 3500ml, the Odds Ratio for a faint event was 2.88 (95% CI 2.57-3.23) and if the EBV is 3500ml-4000ml the Odds Ratio was 2.09 (95% CI1.90-2.31) using the Nadler formula to calculate EBV. Further analysis of their data suggested a synergistic effect on the risk of fainting events with donors less than 23 years of age and an EBV of less than 3500ml being at the greatest risk of adverse events. Subsequently BSI has introduced a height weight restriction for all donors under 23 to ensure an EBV of at least 3500ml.

Rios et al [17] have performed a similar study on data collected in 2 Red Cross regional blood centres participating in the REDS II study. This produced results that were consistent with the BSI study, below.

A Multivariate Logistic regression: of the Odds of feeling faint (~500,000 donations)



Based on this data the American Red Cross have introduced a height weight restriction for all donors under 19 to ensure and EBV of at least 3500ml. The impact of this strategy is being assessed prior to considering expansion of the program to older donors [18].

5.3 Demographic data

5.3.1 Blood volume estimates for the population in the UK

To obtain estimates of blood volume for the population the UK it was necessary to obtain height and weight estimates for the population. The Health Survey for England 2008 surveyed 22,623 individuals of all ages including infants. Data from the survey was used with the kind permission of the Economic and Social Data Service.

The number of both adults and children surveyed is shown in Table 5.3.1, (Appendix 2). Additional data sets were obtained from the Economic and Social Data Service for the Health Survey for England data 2008 (HSE) the analysis of height and weight profiles of adults aged 17 to 30 years. Table 5.3.2 shows the number of individuals

surveyed in each age band and gender for those participants where complete height and weight measurements were available. Age was defined as age at last birthday.

The numbers and percentage of male and female participants aged 17-25 with height and weight measurements below a set of ranges derived from the Nadler formula was calculated using HSE crude data. The Nadler formula was used to calculate EBV by height and weight as this is the formula used in most research into donor adverse events and EBV.

The following heights and weights were used to determine numbers of male who would have an EBV of less than 3500ml, these were:

Height below 150 cm and weight below 52 Kg

Height below 151 cm and weight below 51 Kg

Height below 152 cm and weight below 50 Kg

There were no male participants aged 17-30 years with heights and weights in these categories. The mean height of males aged 17-24 yrs was 177.3 cm and weight 75 Kg. There were six male participants, two in each category, who were selected in these height/weight categories; however, these were all in older age categories (over 80 years of age).

Similar calculations were performed for female survey participants and produced a series of height weight categories for which the EBV would be less than 3500ml (from <167 cm tall and <51kg in weight, by 1kg increasing weight bands to weight < 64kg and height <150cm). The percentage of females in each age band and each height/weight category between ages 17 and 30 are shown in Table 5.3.3. Thus the percentage of women by age who have a calculated EBV below 3,500ml is:

	Age (yrs)													
	17	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**
% of population with EBV<3,500ml	**31**	**13**	**22**	**25**	**19**	**24**	**12**	**17**	**17**	**18**	**9**	**13**	**13**	**19**

5.3.2 Age and sex distribution of NHSBT donors

The active NHSBT donor base in November 2010 contained 1.38 million donors, 46.5% male and 53.5% female, the age sex distribution is shown in Chart 5.3.1. Just

over 72 % of the active donor base is over 30 years of age, with 5% below 20 years of age, 12% below 23 and 18% below 26 years of age (Table 5.3.4).

5.3.3 Estimated number of lost and gained donors

By combining the estimates for the heights and weight of the UK population with the current NHSBT active donor base it is possible to estimate the percentage of the current donor base, by age that will have an EBV of less than 3,500ml (Table 5.3.5). The potential loss of active donors from different strategies for implementing a 15% of EBV maximum blood donation can be estimated. A similar percentage of donors from each age group will not be available for recruitment until they either become older or put on weight (given the ages in question putting on height is unlikely).

If a height weight restriction were used for donor acceptance to ensure the donor's EBV is at least 3,500ml it could be applied to all donors or all donors below a certain age. Obviously the cost in terms of all donors would be very large and the donors would have in most cases have been donating for years without problems. Thus, it would seem logical as in the US to apply the acceptance criteria by age group. In the US these restrictions have been applied to donors under 19 or under 23 years of age, depending on the service. Logically in the UK given the statistically higher faint rate up until the age of 26 it might be appropriate to apply the restriction until that age. In terms of active donor base the loss would be:

Age of application of ht/wt acceptance criteria	Estimated % loss of female donor base	Estimated % loss of male donor base	Estimated % loss of total donor base
<20 years	1%	0%	0.54%
<23 years	2.7%	0%	1.5%
<26 years	3.8%	0%	2%

An estimate of the lost donations can be made based on an estimated donor frequency of 1.4 donations per year.

Age of application of ht/wt acceptance criteria	Estimate loss of donations per annum
<20 years	10,705
<23 years	29,020
<26 years	40,060

These estimates are lower than those calculated in the literature for the US [18] at 2.7% for < 23 years of age [17] as the UK donor base has many fewer young donors than the US donor base. In the US they rely more heavily on college and university sessions and young donors to maintain their blood supply.

Balancing this equation is the number of donors and donations we now lose because the donor has fainted. Faint rates are higher in young donors and the reduction in 12 month return rates after an adverse event is known (Table 5.3.6). From this information and known adverse event rates estimates of total lost donations due to faints in young donors can be calculated. The donations lost and the reduction in these losses if we manage to reduce faint rates by 10 or 20 % is given below. Although as we do not have data for adverse event rates in exactly the same age groups as are proposed for the height weight acceptance criteria it can be seen below that the reduction in lost donations (i.e. gained donations) is of a similar order of magnitude as those lost by implementing the acceptance criteria based on height/weight.

Age range		10% reduced faint rate		20% reduced faint rate	
	Current estimated lifetime lost donations	Estimated lifetime lost donations	Reduction in lost donations	Estimated lifetime lost donations	Reduction in lost donations
17-20	187,549	168,794	18,755	135,035	52,514
17-25	368,358	331,522	36,836	265,217	103,141
17-30	454,380	408,950	45,439	327,160	127,230

5.3 Blood service data

5.3.2 Experience after implementing EBV deferral in the United States of America

Although not yet published in a peer reviewed journal early results following implementation of the new EBV donor deferral protocol by the American Red Cross

(ARC) are now available (Dr A Eder private communication) and are in the public domain. The deferral algorithm was implemented in September 2009. The measures have reduced faint and prefaint rates in young donors. Compared to 2008 the ARC vasovagal events in young whole blood donors in 2009 were:

reduced by 25% in all 16 year old donors.

reduced by 20% in all 17 year old donors.

reduced by 10% in all 18 year old donors.

6 Discussion

6.1 Would only accepting donors with EBV of 3500ml decrease the incidence of adverse reactions?

Evidence suggests that the collection of > 15% of blood volume is deleterious to donor health, in that it causes grade 2 shock. It is also clear from research that the single best independent predictor of donor faints and prefaints (vasovagal events) is an EBV of <3500ml. Current UK blood donation volumes are such that to prevent collection of >15% of blood volume the EBV of the donor should be at least 3500ml. There is a theoretical option to reduce the collection volume in smaller donors but logistically this would be very difficult. However this option should be available in the wording of the guidance.

6.2 Should this restriction be applied to donors of both sexes and all ages or only younger donors?

The forthcoming 16th edition of the Council of Europe guidance actually suggests that all women below 65kg should have their EBV ascertained and a 15% of EBV deferral applied. This seems excessive as in the UK many older donors will have been donating happily for years with an EBV of <3500ml. However as faints are so common in younger donors and the likelihood of them never returning to donate is significant it would seem ethical to apply this restriction to younger donors. Equally the message to young female potential donors that for your safety's sake it would be better to wait until you are either older and or a little heavier is not too difficult to sell. It has proved easy in the US.

In the UK statistically faints are significantly higher in donors under the age of 26. However deferral for all donors under this age would affect 2% of the donor base. The SAC proposes that in the first instance restrictions are applied to female donors

under the age of 20. We suggest that the results of this are reviewed and consideration given to applying the algorithm to all donors under the age of 26.

6.3 Approximately how many donations might be lost or gained?

This is difficult to assess accurately but the suggested deferral would affect about 0.5% of the donor base. The temporary loss of younger smaller (female) donors will be offset over time by the reduction in permanent donor loss, due to donors who have felt faint or actually fainted never returning to donate. There may also be a gain from a reduction in donors witnessing faints. They may be put off from returning to donate but this is unquantified.

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Appendix 1

Current UK Legislation and guidance on age eligibility of blood donors

Blood Safety and Quality Regulations 2005[1]

Acceptance criteria for donors of whole blood and blood components

1.1. Age and body weight of donors

Body weight	≥ 50 kg for donors either of whole blood or apheresis blood components

UK Blood Services Guidelines on Care and Selection of Donors[3]

Donor Weight

Obligatory

Must not donate if:

a) Under 50 kg (7 stone 12 pounds)

b) The donor weight means that they have difficulty in getting onto or off the donation couch.

c) Venous access is very difficult.

d) The safe weight limit of the bleeding couch/chair is exceeded.

e) They are a double red cell donor and weigh under 70 kg (11 stone).

Discretionary

Treatment with anti-obesity drugs, accept.

See if Relevant

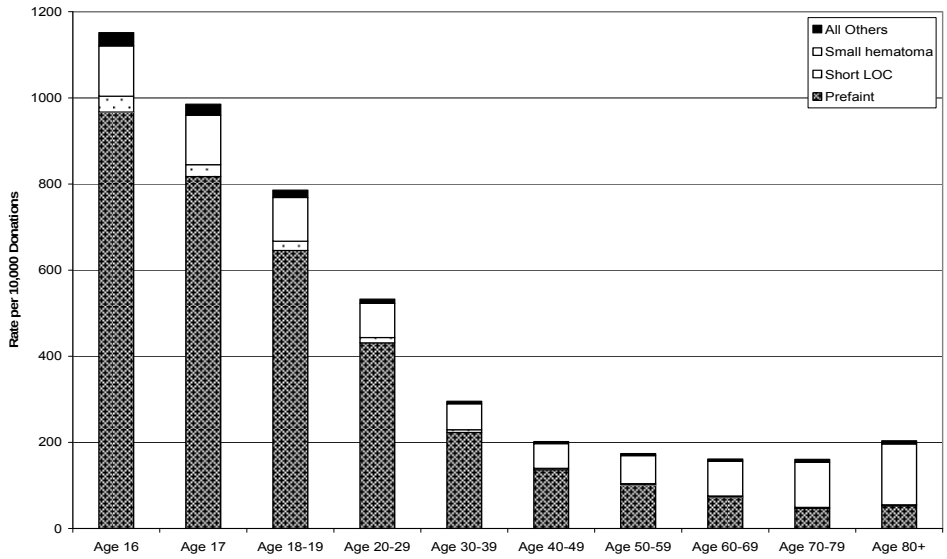
Sleep Apnoea

Additional Information

It no donor should lose more than 15% of their estimated blood volume (EBV) during any donation procedure. During apheresis procedures the extra corporal volume should not exceed 15 % EBV (excluding anticoagulant). ECV is the total volume of blood and plasma removed from the donor at any time. It includes all blood and plasma in collection packs and contained within the machine harness.
This is to protect them from adverse effects such as fainting and becoming anaemic. There is a minimum legal donor weight of 50kg at which a donation can be accepted. This is not appropriate for double red cell donations because of the increased volume, and iron that is being taken from the donor. Obesity also makes it desirable to use more than a donor's weight to estimate their blood volume. Fat contains far less blood as a proportion of its weight than muscle. In obese individuals the blood volume can be seriously overestimated from weight alone. Overestimating a donor's blood volume(particularly in very short obese donors) makes it more likely that they will have an adverse incident.
Blood service staff should not put their own health at risk by helping donors on and off the donation couch, except in an emergency.

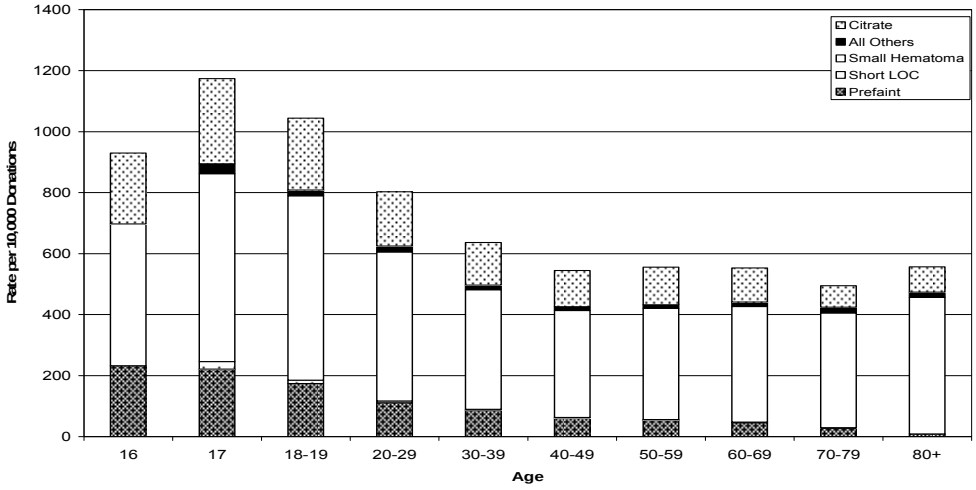
Appendix 2 Tables and Charts

Chart 5.1.1 Rates of Donor Complications Associated with Allogeneic Whole Blood (WB) Donation.



The overall rates are statistically significantly ($p<0.05$) different between each successive age group, except between 60-69 and 70-79 years [11]

Chart 5.1.2 Rates of Donor Complications Associated with Apheresis Platelet (PLT) Donation.



Differences in overall rates between successive age groups are not statistically significant ($p<0.05$) except for between 18-19, 20-29 and 30-39 years [11]

Chart 5.1.3 NHSBT Donor adverse event rates by age

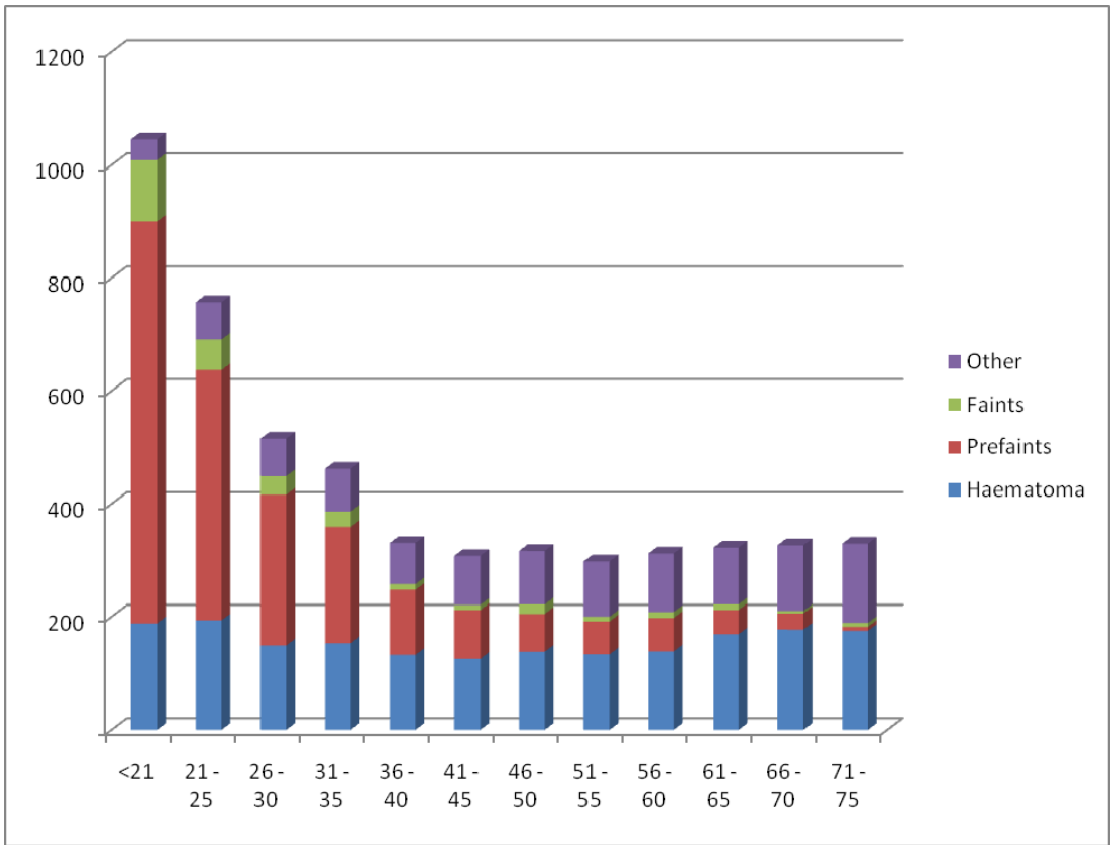


Chart 5.1.4 Faint events by age in NHSBT donors

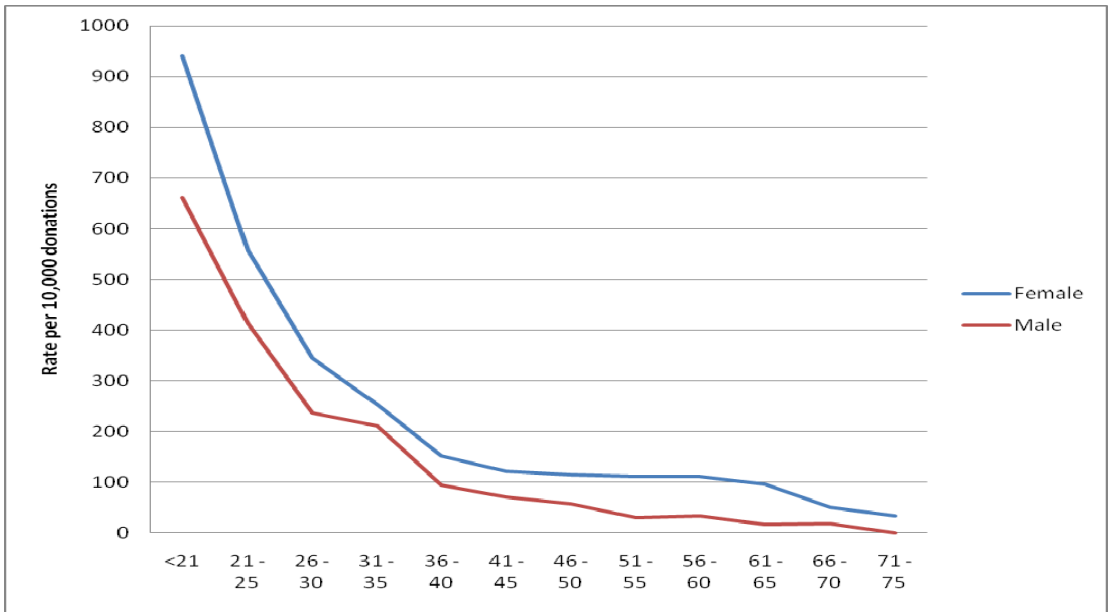


Table 5.3.1 Health Survey for England 2008: numbers surveyed.

Age	Men	Women	Total (%)
0-15	3731	3790	7521 (33.2)
16-24	774	920	1694 (7.5)
25-34	955	1220	2175 (9.6)
35-44	1222	1514	2736 (12.1)
45-54	1101	1374	2475 (10.9)
55-64	1184	1367	2551 (11.3)
65+	1524	1947	3471 (15.3)
Total	10491	12132	22623

Table 5.3.2 Survey participants in each age band (with complete height and weight data).

Age	Men	Women	Total
17	103 (94)	121 (100)	224 (194)
18	84 (76)	100 (80)	184 (156)
19	74 (68)	86 (79)	160 (147)
20	75 (66)	93 (80)	168 (146)
21	77 (71)	99 (88)	176 (159)
22	94 (87)	101 (80)	195 (167)
23	88 (76)	100 (82)	188 (158)
24	73 (59)	110 (100)	183 (159)
25	77 (66)	117 (98)	194 (164)
26	78 (71)	116 (107)	194 (178)
27	102 (91)	117 (98)	219 (189)
28	106 (90)	110 (93)	216 (183)
29	102 (94)	123 (99)	225 (193)
30	99 (87)	116 (102)	215 (189)
Total	1308 (1166)	1631 (1384)	2939 (2550)

Table 5.3.3 Percentage of female survey participants in each age band (only valid results included) with EBV below 3,500ml

		Age (yrs)													
Height (cm)	**Wt (Kg)**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**
<150	<64	3	0	1	2	1	2	3	0	2	1	1	0	1	3
150<151	<63	2	1	1	0	0	1	0	0	0	1	0	0	0	0
151<152	<62	2	0	0	0	1	0	2	2	1	1	1	1	0	0
152<153	<62	1	0	1	0	0	0	1	1	2	2	0	0	1	2
153<154	<61	0	0	2	0	2	0	0	1	0	0	1	0	1	1
154<155	<60	1	1	1	0	0	3	0	0	0	1	0	2	3	2
155<156	<59	0	0	2	0	2	0	0	1	0	0	1	0	1	1
156<157	<59	2	3	0	4	1	1	0	4	1	2	2	1	2	4
157<158	<58	3	1	1	2	2	2	2	3	4	3	0	0	1	0
158<159	<57	2	1	0	3	5	5	1	2	3	2	0	3	1	2
159<160	<56	2	0	3	2	1	3	0	0	0	2	1	1	0	0
160<161	<55	3	2	1	4	1	0	0	0	1	1	1	0	0	2
161<162	<54	1	0	0	2	1	1	1	0	1	0	0	2	0	0
162<163	<54	2	0	0	1	0	1	0	2	1	2	1	2	1	0
163<164	<53	1	0	2	0	0	0	0	1	1	1	0	0	0	1
164<165	<52	4	0	1	0	0	0	0	0	0	0	0	0	1	1
165<166	<51	1	1	1	0	0	0	0	0	0	0	0	0	0	0
	Total	30	10	17	20	17	19	10	17	17	19	9	12	13	19
	Number with valid ht/wt (denominator)	100	80	79	80	88	80	82	100	98	107	98	93	99	102
	% with EBV<3,500ml	**30**	**13**	**22**	**25**	**19**	**24**	**12**	**17**	**17**	**18**	**9**	**13**	**13**	**19**
	Total surveyed	121	100	86	93	99	101	100	110	117	116	117	110	123	116

Chart 5.3.1 Age sex distribution of NHSBT active donor base (November 2010)

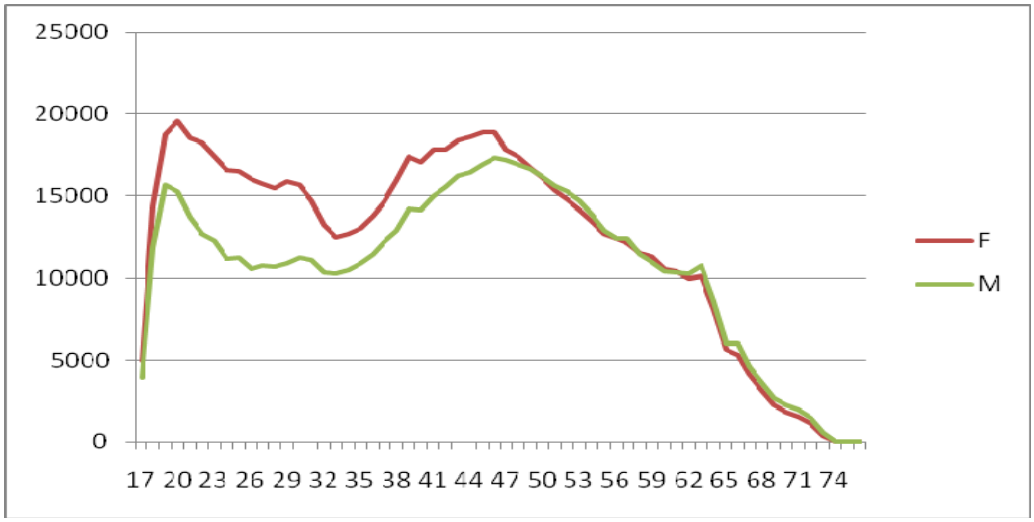


Table 5.3.4 Age Sex distrubution of the active donor base below 31 years of age (November 2010)

Age	*Number of active donors*		*All donors*		*Female donors*		*Male donors*	
	Female	**Male**	**%**	**Cumulative %**	**%**	**Cumulative %**	**%**	**Cumulative %**
17	4982	3901	0.64%	0.64%	0.67%	0.67%	0.61%	0.61%
18	14344	11860	1.89%	2.54%	1.94%	2.61%	1.84%	2.45%
19	18719	15686	2.49%	5.02%	2.53%	5.14%	2.44%	4.89%
20	19573	15299	2.52%	7.55%	2.65%	7.79%	2.38%	7.27%
21	18548	13722	2.33%	9.88%	2.51%	10.30%	2.13%	9.40%
22	18228	12723	2.24%	12.12%	2.46%	12.76%	1.98%	11.38%
23	17431	12258	2.15%	14.26%	2.36%	15.12%	1.91%	13.28%
24	16565	11155	2.00%	16.27%	2.24%	17.36%	1.73%	15.02%
25	16492	11237	2.01%	18.27%	2.23%	19.59%	1.75%	16.76%
26	16063	10536	1.92%	20.20%	2.17%	21.76%	1.64%	18.40%
27	15742	10749	1.92%	22.11%	2.13%	23.89%	1.67%	20.07%
28	15497	10661	1.89%	24.00%	2.10%	25.98%	1.66%	21.73%
29	15907	10870	1.94%	25.94%	2.15%	28.13%	1.69%	23.42%
30	15657	11194	1.94%	27.88%	2.12%	30.25%	1.74%	25.16%
Over 30	515910	481483	72.12%		69.75%			74.84%

Table 5.3.5 Percentage of the active donor base below 31 years of age with an EBV of below 3,500ml (November 2010)

Age	**% of population With EBV <3,500m**	**Number of Female donors**	**Female Donor base**		**Total donor base**	
			%	**Cumulative %**	**%**	**Cumulative %**
17	30	1495	0.20%	0.20%	0.11%	0.11%
18	13	1865	0.25%	0.45%	0.13%	0.24%
19	22	4118	0.56%	1.01%	0.30%	0.54%
20	25	4893	0.66%	1.67%	0.35%	0.89%
21	19	3524	0.48%	2.15%	0.25%	1.15%
22	24	4375	0.59%	2.74%	0.32%	1.47%
23	12	2092	0.28%	3.02%	0.15%	1.62%
24	17	2816	0.38%	3.40%	0.20%	1.82%
25	17	2804	0.38%	3.78%	0.20%	2.02%
26	18	2891	0.39%	4.17%	0.21%	2.23%
27	9	1417	0.19%	4.37%	0.10%	2.33%
28	12	1860	0.25%	4.62%	0.13%	2.47%
29	13	2068	0.28%	4.90%	0.15%	2.62%
30	19	2975	0.40%	5.30%	0.22%	2.83%

Table 5.3.6 12 month return rates after an on session faint by age group

	% of donors returning			Reduction in return rate	
Age	No Adverse Events	Prefaint	Faint	Prefaint	Faint
17-19	69%	53%	33%	16%	36%
20-24	69%	44%	21%	25%	47%
25-29	72%	46%	22%	25%	50%
30-34	76%	50%	33%	26%	43%
35-39	82%	58%	32%	23%	50%
40-44	85%	55%	43%	30%	42%
45-49	87%	57%	13%	31%	75%
50-54	89%	72%	33%	17%	56%
55-59	91%	73%	40%	18%	51%
60-64	92%	78%	29%	14%	64%
65-69	91%	71%	25%	20%	66%

Table 5.3.7 Potential lifetime donations lost in young female donors who have a fainting event

Age range	Current % of donors suffering		Total donors	Number of donor who have		Number of donors lost due to			Estimated lifetime lost Donations	
	prefaint	faint		prefaints	faints	prefaints	faints	Total		
<21	8.33	0.83	57,618	4,800	478	2,256	320	2576	187,549	
21-25	4.96	0.47	87,264	4,328	410	2,424	324	2748	180,809	
26-30	2.93	0.35	78,866	2,311	276	1,248	215	1463	86,032	
	10% less		Total donors	Number of donor who have		Number of donors lost due to			Estimated lifetime lost Donations	Reduction in lost donations
	prefaint	faint		prefaints	faints	prefaints	faints	Total		
<21	7.50	0.75	57,618	4,320	430	2,030	288	2319	168,794	18,755
21-25	4.46	0.42	87,264	3,895	369	2,181	292	2473	162,728	18,081
26-30	2.64	0.32	78,866	2,080	248	1,123	194	1317	77,428	8,603
	20% less		Total donors	Number of donor who have		Number of donors lost due to		Total	Estimated lifetime lost Donations	Reduction in lost donations
	prefaint	faint		prefaints	faints	prefaints	faints			
<21	6.00	0.60	57,618	3,456	344	1,624	231	1855	135,035	52,514
21-25	3.57	0.34	87,264	3,116	295	1,745	233	1978	130,182	50,627
26-30	2.11	0.25	78,866	1,664	199	898	155	1053	61,943	24,089