Worldwide policies on epilepsy and blood donation: a survey among blood services

Alyssa Kellens, Emmy De Buck, Marie-Paule Emonds, Philippe Vandekerckhove, Lieven Lagae

Centre for Evidence-Based Practice, Belgian Red Cross, Mechelen, Belgium

Short title: Policies on epilepsy and blood donation

Correspondence:

Emmy De Buck, Centre for Evidence-Based Practice, Belgian Red Cross, Motstraat 42, 2800 Mechelen, Belgium

E-mail: emmy.debuck@rodekruis.be

Abstract

Background and objectives: Epilepsy is a common neurological disorder characterized by the appearance of seizures. Often, epilepsy patients are temporarily or permanently excluded from blood donation. To gain a better understanding of the policies that are currently applied, we performed a survey amongst blood services.

Methods: A cross-sectional, web-based questionnaire using the online Questback[®] tool was developed and distributed to 46 representatives of blood services worldwide. The questionnaire was composed of 9 questions.

Results: A total of 27 respondents, representing blood services in 26 countries on five continents, participated in the survey. Current policies range from permanent acceptance over temporary exclusion to permanent exclusion. Rationales for these different policies are diverse. The majority of blood services (59.3%) apply temporary exclusion as their policy, though no consensus exists on the length of time that epilepsy patients have to be medication- or seizure-free. None of the respondents could provide data about adverse events in epilepsy patients during the blood donation process.

Conclusions: The results of this survey indicate a large discrepancy in policies applied worldwide. A lack of scientific evidence could be one of the underlying reasons. Therefore, it is of paramount importance to further research the potential risks for donors and recipients regarding blood donation by people with epilepsy. This can then serve as a base for evidence-based policy making and lead to safer and more effective blood transfusion programs.

Keywords: blood donation, blood donor, epilepsy, policy

Introduction

Blood donor eligibility criteria ensure safety for both the donor and recipient. They are quite comprehensive, but they often differ from country to country and even from region to region. In general, potential donors have to meet certain criteria in terms of age, weight and time between donations, before they are asked to fill out a medical questionnaire. Roughly, this questionnaire contains items about the donor's medical, travel and sexual history [1]. When donor eligibility criteria are met, donor adverse events can be prevented but not excluded. In general, about one in three donors will experience one or more adverse events during the blood donation process. Certain donor characteristics, such as gender, age and donation status, influence the risk of adverse events [2-4]. One of the eligibility criteria with regards to prevention of donor adverse events concerns epilepsy.

Epilepsy is a neurological disorder characterized by the appearance of seizures, which are caused by abnormal neuronal firing in the brain, when there is an imbalance between excitation and inhibition. When these seizures are recurrent and unprovoked, they can be classified as epilepsy, which is not to be confused with a convulsive syncope, caused by other pathophysiologic mechanisms [5, 6]. The prevalence of epilepsy in the general population is about 1%. Seizures can be classified into two types: generalized seizures and partial (focal) seizures. A generalized seizure is characterized by abnormal neuronal firing in the two cerebral hemispheres, involving the entire brain simultaneously, whereas partial seizures begin in a local area of the brain [7]. Generalized seizures are further divided in 4 subtypes: (1) tonic-clonic seizures, characterized by bilateral symmetric convulsive movements, (2) absence seizures, characterized by staring with unresponsiveness, (3) myoclonic seizures, consisting of brief, sudden muscle contractions without loss of consciousness, and (4) atonic seizures, characterized by loss of body tonus. Seizures can be provoked by specific triggers such as reading, writing, auditory stimuli, visual stimuli (such as flickering light), immersion in hot water, eating, ... [5, 8].

Blood donation is not a documented trigger for seizures, however, historically it is believed that giving blood could evoke a new epileptic seizure, probably as a confusion with syncope which is the most frequent adverse event in blood donors. In addition, it is thought that medication in the blood of epilepsy patients could have a negative effect on the recipient of the blood [6, 9]. In most cases, the disease can be managed with anti-epileptic drugs in monotherapy or in combination therapy if necessary [5].

1 To gather and evaluate the policies from different blood institutions around the world
2 regarding the eligibility of epilepsy patients as blood donors, a cross-sectional study was set
3 up using a web-based questionnaire.

Methods

Participants

A cross-sectional questionnaire using the online Questback[®] tool was distributed in May 2015 to 46 representatives of blood services worldwide. The applied method for sending the questionnaire to each representative was based on international agreements (i.e. the representatives of blood services in Africa, America and Europe were contacted by personal e-mail and those in Asia and Oceania by web link through the Asia Pacific Blood Network). The list of contacted representatives of blood services was determined by the available contact information at Belgian Red Cross. The data were collected and analyzed from June 2015 until September 2015. Descriptive analysis was used to evaluate the data.

Questionnaire

The questionnaire was composed of 9 multiple choice questions with the ability to select multiple answers and/or add a comment if necessary in selected questions. Each participant was only presented with those questions that were relevant and logical to him/her. The questions that were submitted to a certain participant were i.e. dependent on his/her answer to the initial question ‘Do you accept patients with epilepsy for blood donation, assuming that all other requirements for blood donation are fulfilled?’. If a participant answered the initial question with ‘they are permanently excluded’, that participant only had to answer question 1 and 2 to complete the questionnaire. If the participant answered the initial question with ‘they are temporarily excluded’, he/she had to answer question 1 to 9. If the participant finally answered the initial question with ‘they are permanently accepted’, the participant had to answer question 1 to 5 and 8 to 9.

The goal of this questionnaire was to gain insight into the different policies and the rationales behind them. Question 1, 2, 6 and 7 investigated whether epilepsy patients are accepted or excluded, as well as the length of exclusion and the reason for exclusion. Questions 3, 4, 5 and 8 were designed to assess which additional policies are used by blood centers to potentially lower the risks for donors and recipients. Finally, question 9 investigated whether epilepsy patients experience more syncopes than healthy donors and asked for supporting data if available.

All questions and possible answers are provided as Supporting Information.

Results

A total of 27 respondents, representing blood services in 26 countries on five continents (Africa, America, Asia, Europe and Oceania) participated in the survey (Table 1), which is a response rate of 27/46 or 59%. Representatives from the two main blood services in the United States (America's Blood Centers and American Red Cross) both filled out questionnaires. Of the 27 respondents, one participant only partially completed the survey. The representatives who did not fill out the questionnaire mostly originated from Europe, which is not surprising as this continent contained the largest number of contacted representatives. An overview of the answers on each question of the questionnaire are presented below.

Question 1: 'Do you accept patients with epilepsy for blood donation, assuming that all other requirements for blood donation are fulfilled?'

The policies that could be chosen were permanent exclusion, temporary exclusion or permanent acceptance. The results show that there are significant global differences. In 59.3% of the cases, epilepsy patients are temporarily excluded from blood donation (Figure 1). In 29.6% of the cases, they are permanently excluded. Finally, in 11.1% of the cases epilepsy patients are accepted as blood donors.

In Europe, 9 out of 15 respondents selected temporary exclusion, whereas 6 out of 15 respondents selected permanent exclusion; none of the respondents applies permanent acceptance. In Asia, great differences exist, as all three policies are applied by the respondents. In America, the results show that epilepsy patients are always excluded temporarily from blood donation by the blood centers who responded. In Africa and Oceania, in contrast, all respondents selected permanent acceptance.

Question 2:

'Why do you accept/refuse patients with epilepsy as blood donors?'

The results show that several reasons are used to accept or refuse epilepsy patients as blood donors. More than half of the respondents (55.5%) selected expert consensus/personal opinion/preference as a reason for acceptance or exclusion (Figure 2). Other reasons are internal regulations (44.4%), laws (40.7%) and ethical concerns (7.4%). Some respondents provided additional reasons (e.g. acceptance or exclusion is an individual medical decision). The majority of respondents who referred to the law as a reason for acceptance or deferral, originate from European countries (Austria, Belgium, Estonia, Great-Britain, Ireland, Italy,

1 the Netherlands, Spain, Sweden), but blood donations by epilepsy patients are also regulated
2 by law in Taiwan and Japan. The policy currently being applied in these countries, is most
3 often temporary exclusion.

4 **Question 3:**

5 **‘In those countries/states/blood transfusion services where epilepsy patients are**
6 **accepted as blood donors, either permanently or after temporary exclusion: Do epilepsy**
7 **patients need more guidance (e.g. clinical/technical investigations, follow-up**
8 **before/during/after the donation, etc.) compared to otherwise healthy donors?’**

9 The majority of respondents (72.2%) answered that epilepsy patients don’t need more
10 guidance before, during or after the donation compared to otherwise healthy donors.
11 However, 27.8% of the respondents indicated that epilepsy patients do need extra care,
12 especially during the blood donation process (22.2%), and to a lesser extent before or after
13 the donation (5.6%). One respondent also saw a role for the treating physician of the donor,
14 who can provide extra care before or after the blood donation process.

15 **Question 4:**

16 **‘In those countries/states/blood transfusion services where epilepsy patients are**
17 **accepted as blood donors, either permanently or after temporary exclusion: Does the**
18 **blood donation center require the waiting period between blood donations to be longer**
19 **in epilepsy patients compared to otherwise healthy donors?’**

20 None of the blood services require longer waiting periods between donations for donors with
21 epilepsy.

22 **Question 5:**

23 **‘In those countries/states/blood transfusion services where epilepsy patients are**
24 **accepted as blood donors, either permanently or after temporary exclusion: Are there**
25 **any extra laboratory tests done afterwards (e.g. to detect levels of anticonvulsants in**
26 **blood samples)?’**

27 All respondents (94.4%), except for one, indicated that no extra laboratory tests are performed
28 on the blood of epilepsy patients. One respondent indicated that extra laboratory tests are
29 performed but did not further specify which one(s).

30 **Question 6:**

31 **‘In those countries/states/blood transfusion services where epilepsy patients are**
32 **temporarily excluded from blood donation: How long (at least) do they have to be**
33 **medication-free before they can donate blood?’**

1 Most centers (73.3%) indicate that epilepsy patients have to be medication-free for at least
2 three years before they can donate blood (Figure 3). However, other time frames are also
3 applied ranging from two to five years. In the US, on the other hand, the two blood services
4 apply different policies as the time frame is variable at one center, and being off medication
5 is not a factor for the in- or exclusion at the other center.

6 **Question 7:**

7 **‘In those countries/states/blood transfusion services where epilepsy patients are**
8 **temporarily excluded from blood donation: How long (at least) do they have to be**
9 **seizure-free before they can donate blood?’**

10 At most blood donation centers (66.7%) epilepsy patients have to be seizure-free for at least
11 three years before they can donate blood (Figure 3). The other time frames applied are one or
12 a few months (6.7%), two years (6.7%), five years (6.7%) and a variable time frame between
13 six months and a year (6.7%).

14 **Question 8:**

15 **‘In those countries/states/blood transfusion services where epilepsy patients are**
16 **accepted as blood donors, either permanently or after temporary exclusion: Is there a**
17 **difference in the volume of blood that epilepsy patients can donate in comparison to**
18 **otherwise healthy donors?’**

19 Epilepsy patients can donate the same amount of blood as healthy donors at all blood services
20 accepting people with epilepsy.

21 **Question 9:**

22 **‘In those countries/states/blood transfusion services where epilepsy patients are**
23 **accepted as blood donors, either permanently or after temporary exclusion: Are**
24 **syncopes during the blood donation process more frequent in blood donors with a**
25 **history of epilepsy compared to otherwise healthy donors?’**

26 This question was used to gauge for data with regards to adverse events in epilepsy patients.
27 Since syncopes are a frequent adverse event during blood donations, this event was used as
28 an example. The results show that none of the respondents have data on the prevalence of
29 syncopes in epilepsy patients compared to healthy patients..

Discussion

In this study, policies regarding the eligibility of blood donors with a history of epilepsy were assessed. Some blood institutions accept epilepsy patients as blood donors, whereas others temporarily or even permanently exclude them. Historically, the rationale for exclusion of epilepsy patients as blood donors is two-fold: (1) it is believed that donating blood could evoke a new epileptic seizure and/or (2) medication in the blood of epilepsy patients could have a negative effect on the recipient of the blood [6, 9].

In total, 27 respondents from five continents completed the questionnaire. Although this survey does not present a complete overview of all blood donation services, the major centers (in volume) from around the world are represented. A limitation of our survey is that answers provided for a specific blood transfusion center are not necessarily representative for the respective country or region. For example, the United States independent blood centers, America's Blood Centers (ABC), do not all handle the same deferral policy, since each center is allowed to formulate its own blood donor eligibility criteria, as long as these are in accordance with FDA requirements (personal communication Medical Director United States ABC).

The results of this survey indicate a large discrepancy in policies worldwide, which most likely reflects the lack of underlying scientific evidence as a basis for policy making. This lack of evidence implies that policy makers today have to base their policy decisions on other elements, as indicated in the survey. These elements differ from blood institution to blood institution and carry an intrinsic risk for an incautious or overcautious attitude. Being overcautious implies missing blood donations from epilepsy patients that are potential eligible blood donors. Being incautious, on the other hand, can generate unnecessary risks for donors and/or recipients.

When processing the results of this survey, it was surprising that no blood transfusion service could provide data about syncope in epilepsy patients during the blood donation process. This lack of data illustrates the need for better epidemiological data on epilepsy patients and blood donation. We therefore encourage blood transfusion services that accept epilepsy patients as blood donors to keep more detailed records regarding adverse effects.

In 1986, van der Linden and colleagues, performed a small survey in the Netherlands in which 3 questions concerning blood donation and epilepsy were sent to 22 blood banks: (1) whether they accepted patients with epilepsy as blood donor, (2) whether they accepted some patients and not others, and (3) what criteria were used [6]. The results were surprising in that a lot of

1 variability within one country was shown. Whilst some centers refused all patients using anti-
2 epileptic drugs, others made a distinction between drug doses (high versus maintenance
3 doses). Some centers also required a seizure-free period of 2, 3 or 5 years. In a minority of
4 the cases however neither criterium was used and blood could be donated by epilepsy patients
5 who were on medication and still having seizures [6].

6 The variety in policies regarding the different aspects of the medical questionnaire is further
7 demonstrated in two other studies. In 2011, Benjamin et al. published the results from a
8 survey on the blood donor eligibility policies for men having sex with men, and in 2013,
9 Pauwels et al. published a similar survey concerning the use of blood of hemochromatosis
10 patients as donor blood [10, 11]. The findings in these articles are similar to the findings
11 presented in this article, i.e. there is no uniformity in worldwide blood donor eligibility
12 policies, and policies are not based on scientific evidence. Further medical research and effort
13 is therefore needed. This will lead to evidence-based policy making, and safer and more
14 effective blood transfusion programs [12].

Conclusion

This study confirms that large discrepancies in policies with regard to epilepsy patients and blood donation exist between the different blood services. A lack of scientific evidence regarding the safety for both donor and recipient is probably a major contributor to the existence of different policies, and further research is certainly needed. Standardization of the worldwide policies, based on evidence-based policy making, will lead to a safer and more efficient blood transfusion program, which will ultimately benefit the outcome in donor and recipient.

Acknowledgments

The authors would like to thank all blood services in this study for their contribution. This work was made possible through funding from the Foundation for Scientific Research of the Belgian Red Cross. All authors, except for Lieven Lagae, are employed by the Belgian Red Cross. Philippe Vandekerckhove and Lieven Lagae contributed to the research design, Alyssa Kellens and Emmy De Buck developed the survey, Alyssa Kellens analysed the data, and wrote the draft manuscript with support of Emmy De Buck. All authors critically revised the paper and approved the submission of the final version of the manuscript. We thank Anne-Catherine Vanhove (Centre for Evidence-Based Practice, Belgian Red Cross) for proofreading the paper.

References

- 1 European Parliament and Council of the European Union: Directive 2002/98/EC of the European Parliament and of the Council of 27 January 2003 setting standards of quality and safety for the collection, testing, processing, storage and distribution of human blood and blood components and amending Directive 2001/83/EC. <http://data.europa.eu/eli/dir/2002/98/oj> (Last accessed February 24, 2017)
- 2 Burkhardt T, Dimanski B, Karl R, et al.: Donor vigilance data of a blood transfusion service: A multicenter analysis. *Transfusion and apheresis science : official journal of the World Apheresis Association : official journal of the European Society for Haemapheresis* 2015; 53: 180-4.
- 3 Newman BH, Pichette S, Pichette D, et al.: Adverse effects in blood donors after whole-blood donation: a study of 1000 blood donors interviewed 3 weeks after whole-blood donation. *Transfusion* 2003; 43: 598-603.
- 4 Newman BH: Whole-blood donation: blood donor suitability and adverse events. *Current hematology reports* 2004; 3: 437-43.
- 5 Stafstrom CE, Carmant L: Seizures and epilepsy: an overview for neuroscientists. *Cold Spring Harbor perspectives in medicine* 2015; 5.
- 6 van der Linden GJ, Siegenbeek van Heukelom LH, Meinardi H: Blood donation, a risk for epileptic patients? *Vox sanguinis* 1986; 51: 148-51.
- 7 Banerjee PN, Filippi D, Hauser WA: The descriptive epidemiology of epilepsy-a review. *Epilepsy Research* 2009; 85(1): 31-45.
- 8 Lanny YX, Ritaccio AL: Reflex seizures and reflex epilepsy. *American Journal of Electroneurodiagnostic Technology* 2006; 46(1):39-48.
- 9 Krumholz A, Ness PM, Hauser WA, et al.: Adverse reactions in blood donors with a history of seizures or epilepsy. *Transfusion* 1995; 35: 470-4.
- 10 Benjamin RJ, Bianco C, Goldman M, et al.: Deferral of males who had sex with other males. *Vox sanguinis* 2011; 101: 339-67.
- 11 Pauwels NS, De Buck E, Compennolle V, et al.: Worldwide policies on haemochromatosis and blood donation: a survey among blood services. *Vox sanguinis* 2013; 105: 121-8.
- 12 Borra V, Vandewalle G, Van Remoortel H, et al.: Blood donor deferral: time for change? An evidence-based analysis. *International Journal of Clinical Transfusion Medicine* 2016; 4: 55-66.

Figure and Table Legends

Figure 1: Bar chart representing the answers on the question ‘Do you accept patients with epilepsy for blood donation, assuming that all other requirements for blood donation are fulfilled?’

Figure 2: Bar chart representing the answers on the question ‘Why do you accept/refuse patients with epilepsy as blood donors?’

Figure 3: Bar chart representing the answers on the questions: ‘In those countries/states/blood transfusion services where epilepsy patients are temporarily excluded from blood donation: How long (at least) do they have to be medication-free (light grey) or seizure-free (dark grey) before they can donate blood?’

Table 1. List of survey respondents and their affiliation.

Table

Table 1.

Continent	Affiliation
Africa	South African National Blood Service
America	Canadian Blood Services
	Honduran Red Cross
	America's Blood Centers
	American Red Cross
Asia	Hong Kong Red Cross
	Magen David Adom in Israel
	Japanese Red Cross Society
	Korean Red Cross
	Taiwan Blood Services Foundation
	Thai Red Cross Society
Europe	Austrian Red Cross
	Belgian Red Cross
	Organisation of Transfusions Centres in Denmark
	North Estonia Medical Centre
	Finnish Red Cross
	Établissement français du sang
	German Red Cross
	NHS Blood and Transplant
	Centro Nazionale Sangue (Italian National Blood Centre)
	Irish Blood Transfusion Service
	State Blood Donor Centre
	National Blood Transfusion Service
	CCST (Comité Científico para la Seguridad Transfusional)
	Karolinska Institutet
	Sanquin
Australia	Australian Red Cross