ORIGINAL ARTICLE

Vox Sanguinis ISBT International Society of Blood Transfusion

Motivation, blood donor satisfaction and intention to return during the COVID-19 pandemic

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Funding information
The study was funded by the German Red Cross Blood Donation Service Baden-Wuerttemberg-Hessen or North-East

Abstract

Background and Objectives: This study aimed to describe motives as well as donation experiences and the intention to return for further donations of German whole blood donors who donated at the beginning of the COVID-19 pandemic.

Materials and Methods: To describe motives and donor experiences, a retrospective survey was conducted among whole blood donors that had a donation appointment at the German Red Cross Blood Donation Service in the first 4 weeks of the pandemic. A donor questionnaire including 17 retrospective questions was sent to 7500 donors. Donor motivation and donor experiences were compared for different donor groups using chi-square statistics. Finally, in an ordinal logistic regression model predictors for the intention to return were identified.

Results: More than half of the participating donors (56.9%) wanted to contribute to the fight against the pandemic by donating blood. Most of the donors were satisfied with their last donation experience and felt safe during the blood donor appointment. However, some donors would have liked more information on how to deal with the pandemic (20.3%). Intention to return for further donations was strongly associated with overall satisfaction (OR: 1.67, CI: 1.47–1.90) and the feeling of being safe during blood donation (OR: 1.33, CI: 1.05–1.68).

Conclusion: Donor satisfaction with the last donation was high and the vast majority of donors felt very safe. However, those donors who felt unsafe expressed a low intention to return and blood donation services should therefore carefully monitor donor satisfaction.

KEYWORDS
blood donation, COVID-19, donor motivation, donor return, donor satisfaction

Highlights

- 56.9% of the participating donors wanted to contribute to the fight against the pandemic by donating blood.
- Most of the donors were satisfied with their last donation experience and felt safe during the blood donor appointment.
- Intention to return for further donations was strongly associated with overall satisfaction with the last donation experience and the feeling of being safe during blood donation.

INTRODUCTION

Blood donation services have to secure blood supply even in times of crisis. As long-term storage is not possible, blood donors also have to be recruited continuously during extraordinary events. In the case of disasters such as earthquakes, terrorist attacks or tsunamis, the care of a large number of injured people usually requires significantly more blood products. Donor recruitment must be intensified. Previous studies show high solidarity during the first week after a disaster and that many first-time donors can be recruited [1, 2]. In contrast, emerging pandemics may not increase blood demand but impact donor motivation negatively. Due to the ongoing risk of infection, many donors may hesitate to visit a donation facility.

At the beginning of the current COVID-19 pandemic, there was indeed a decline in the number of donations, similar to previous outbreaks of infectious diseases. For example, in the Chinese region Zhejiang, the volume of blood donations at the beginning of 2020 declined by 67% [3]. Declining donation numbers at the beginning of the pandemic were also reported in Italy, Brazil, Spain, Greece and Iran [4–8]. The pandemic studies discuss various causes for the significant decline: First, in many countries, the usual number of mobile donation sites could not be maintained at the beginning of a pandemic [7]. Second, additional reasons for deferral in the context of the pandemic were reported, which led to a reduction in the potential donor base [8]. Third, many donors were afraid of getting infected by COVID-19 during blood donation. In a survey of potential donors in the Chinese Zhejiang province during the COVID-19 pandemic, fear of infection (81.2%) and concern about weakening the immune system (14.1%) were by far the most frequently mentioned barriers [3]. As a result, many donors stayed at home and avoided potential infections.

Donors who gave blood during the pandemic often wanted to contribute to overcoming the crisis and support their health system [9]. How the general motivation to donate changed during the pandemic, however, has hardly been described so far. Furthermore, very little is currently known about donor satisfaction with the measures taken to avoid the risk of infection during blood donation. The German Red Cross Baden-Wuerttemberg—Hessen, for example, implemented numerous changes in donation procedures during the first wave of the COVID-19 pandemic from 22 March 2020. These changes included the introduction of mandatory online appointment booking, moving to larger blood donation sites for at least 5 days instead of daily changing mobile donation sites, measuring body temperature at the entrance and the distribution of surgical face masks to every single donor [10]. It is unclear how these measures influence donor satisfaction and the intention to return for further donations. Therefore, this study aims to describe the motives as well as donation experiences of blood donors who donated at the very beginning of the COVID-19 pandemic. Furthermore, we examined whether the respective donor experience influences the intention to return for further donations.

METHODS

Study population

On 22 March 2020, the German government implemented a partial lockdown in order to limit the number of COVID-19 infections [11].

To describe motives and donor experiences at the beginning of the COVID-19 pandemic, a retrospective anonymous survey was conducted among 7500 German whole blood donors who had a donation appointment between 23 March and 18 April 2020. Both donors who were allowed to donate and deferred donors were included in the sample. The sample size was calculated to assess differences between inexperienced, experienced, and very experienced donors by assuming a response rate of 40%. The sample was drawn using a random number among donors of the German Red Cross Blood Donation Service Baden-Wuerttemberg—Hessen and North-East. The German Red Cross Blood Donation Service collects around 75% of all blood donations in Germany and is divided into six regional units.

In May 2020, a self-administered questionnaire was mailed to the selected donors along with a personalised introduction letter, a data security statement and a stamped, pre-addressed return envelope. Besides this, donors had the opportunity to fill out the questionnaire online. The data collection was stopped on 31 July 2020. No monetary compensation was paid for either the blood donation or the participation in the survey. The study was approved by the Ethical Committee of the Medical Faculty Mannheim, Heidelberg University (2020-572-AF 5).

Survey instrument

The donor questionnaire included questions on donor motivation, donor recruitment, satisfaction with the last donation, experiences with additional safety measures, donation history and socio-demographic characteristics. To assess the motivation of the donors, the participants were asked to rate nine possible motives as "applicable" or "not applicable." The motives included the importance of potential health benefits from donating blood, altruistic motives, motivation by the pandemic and the importance of invitations from others. These motives had already been used in a previous survey among German donors [12].

Further questions were asked about satisfaction with the measures to avoid infection during blood donation. In detail, donors were asked to indicate whether sufficient distance was kept during blood donation, whether they felt safe, whether they thought the temperature measurement was appropriate, and whether they were adequately informed about the handling of the COVID-19 pandemic (see Table 2). A 5-point Likert scale was offered ranging from "totally disagree (1)" that indicates a very low satisfaction to "totally agree (5)" that indicates a very high satisfaction. For the bivariate analysis, the ratings were categorised into "disagree/neutral" (1–3) "agree" (4), and "totally agree" (5). In addition, donors were asked how satisfied they were overall with the last donation experience. Again, the answers were measured by a scale ranging from "very dissatisfied (1)" to "very satisfied (5)." For the bivariate analysis, the ratings were categorised into "low/medium satisfaction" (1–3) "high satisfaction" (4) and "very high satisfaction" (5). To measure intention to return for further donations, the participating donors were asked how likely it is that they continue to give blood at the German Red Cross Blood Service. Responses were captured using a 5-point Likert scale from "very unlikely" to "very likely."

Statistical analysis

First, we calculated the proportion of donors who felt motivated by nine different motives and compared the proportion between younger donors (18–29 years), middle-aged donors (30–54 years) and older donors (55+ years). Second, we analysed whether donor characteristics (sex, age, education, previous donation and donor deferral) were correlated with donor satisfaction with different aspects of the last donation during the pandemic. Multiple chi-square tests were performed to test for bivariate associations, and p values < 0.05 were considered significant. Third, multiple ordinal logistic regression modelling was used to study the association between satisfaction with different aspects of the last donation during the pandemic and the intention to return for further donations. The dependent variable was the intention to return that was measured on an ordinal scale from "very unlikely" to "very likely," whereas very unlikely was the reference category. We calculated odds ratios that a respondent reported a high intention to return for further donations. Separate regression models were estimated for inexperienced, experienced and very experienced donors. All models were adjusted for sex, age, education and donor deferral.

RESULTS

A total of 7500 self-administered questionnaires were mailed to whole blood donors who donated or were deferred between 23 March and 18 April 2020. Until the end of July 2020, a total of 4355 (58.1%) completed questionnaires were returned. About 568 (13%) of the questionnaires were completed electronically, which was particularly used by younger and more highly educated donors. Due to missing values for relevant questions, 22 questionnaires were excluded from the analysis. In addition, 778 donors were excluded who reported a second donation during the pandemic. In our survey, we asked the donors about their "last donation" assuming that this was the first donation during the pandemic. Responses of those donors who have already donated twice since March 2020 may not be comparable due to habituation effects to donating during the pandemic. The final sample consisted of 3555 donors, of which 1608 (45.3%) were men, 1941 (54.6%) were women and 3 (0.1%) identified themselves neither as a man nor as a woman. The majority of the participants were either experienced (26.8%) or very experienced donors (47.1%) with 5–15 or more than 15 previous donations. The percentage of inexperienced donors with less than five donations was 26.1%, of which 10.7% were making their very first donation attempt. About 56.6% of the donors reported having a high educational level, and 33.2% reported having a medium educational level. Of all participants, 4.0% were deferred on their last donation attempt.

Regarding their motivation for their last donation, almost all donors (98.1%) reported that they wanted to help others. Therefore, they can be described as altruistically motivated, acting benevolently, or seeking warm glow (Figure 1) [13]. The desire to contribute to the fight against the corona pandemic was mentioned by 56.9% of the participating donors. Especially among young donors (66.3%), as well
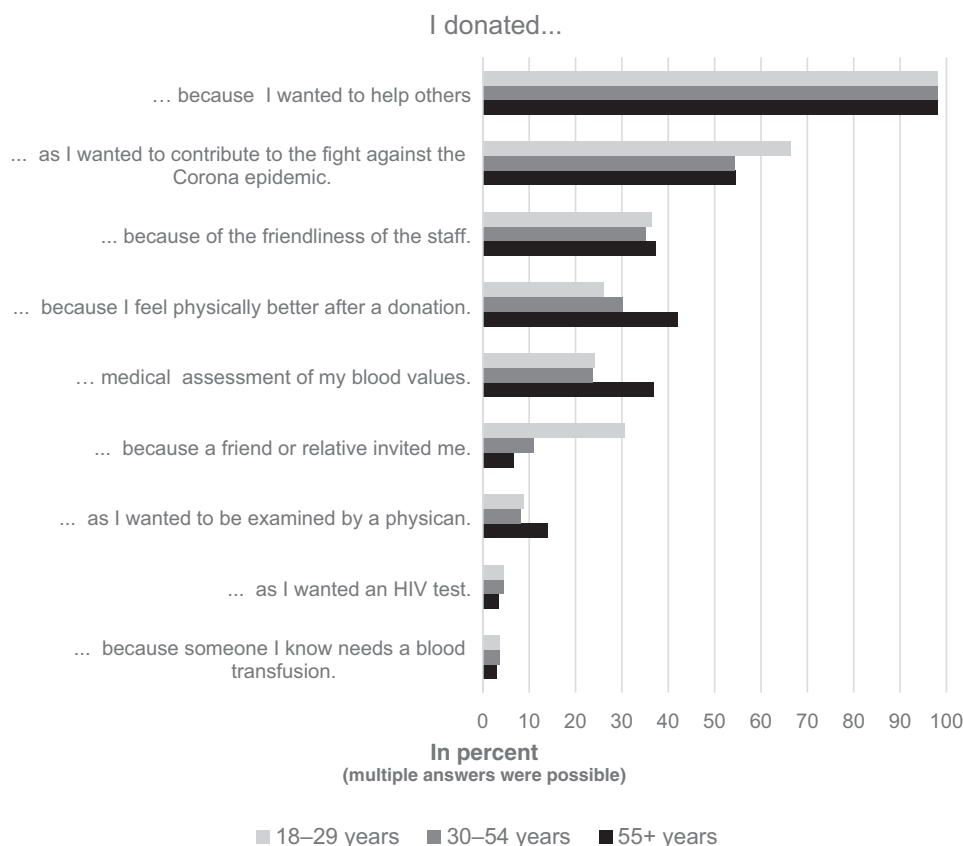
FIGURE 1 Donor motivation by age group

TABLE 1 Satisfaction with safety measures during blood donation

	"During the blood donation, sufficient distance to other donors was ensured."				"I felt safe at the donation appointment."				"I found the temperature measurement at the entrance to be adequate."				"I have received sufficient information on how to deal with the Corona virus."				"Overall, how satisfied were you with your last blood donation appointment?"			
	Disagree/ neutral (%)	Agree (%)	Totally agree (%)	Chi-square	Disagree/ neutral (%)	Agree (%)	Totally agree (%)	Chi-square	Disagree/ neutral (%)	Agree (%)	Totally agree (%)	Chi-square	Disagree/ neutral (%)	Agree (%)	Totally agree (%)	Chi-square	Low/ medium (%)	High (%)	Very high (%)	Chi-square
Total	5.5	17.0	77.5		4.3	15.6	80.1		7.1	18.5	74.3		20.3	26.4	53.3		12.5	28.6	58.9	
Sex				17.5***				12.7**				35.6***				6.0*				18.0***
Men	5.1	19.9	75.0		4.3	18.0	77.7		8.8	21.7	69.5		20.6	28.2	51.2		13.3	31.6	55.1	
Women	5.8	14.6	79.6		4.3	13.6	82.1		5.8	15.9	78.3		20.1	24.8	55.0		11.9	26.0	62.1	
Age				9.6*				5.4				13.2*				23.7***				5.5
18–29	7.3	18.0	74.7		5.1	15.0	79.9		9.0	16.6	74.5		25.2	27.6	47.3		12.7	31.4	55.9	
30–54	5.5	16.6	78.0		4.5	15.0	80.4		7.6	19.3	73.1		20.2	24.8	55.0		12.9	28.1	59.0	
55+	4.2	16.9	78.9		3.4	17.0	79.6		5.1	18.9	76.0		17.0	28.0	55.1		11.9	27.2	60.9	
Education				8.9				0.8				3.2				4.5				13.8**
Low	5.1	12.7	82.2		4.3	15.7	80.1		7.3	18.3	74.4		19.5	23.0	57.6		11.3	23.2	65.5	
Medium	4.5	16.9	78.6		3.9	16.2	79.8		7.4	20.0	72.6		19.8	25.9	54.2		12.3	26.6	61.1	
High	5.9	17.8	76.3		4.3	15.2	80.4		6.8	17.8	75.5		20.5	27.5	52.0		12.6	30.7	56.7	
Previous donations				2.8				6.8				4.0				10.3*				7.4
0–4	6.2	16.7	77.1		5.4	13.7	80.9		6.7	16.8	76.5		22.4	25.8	51.8		13.5	28.9	57.6	
5–15	5.5	16.1	78.4		3.5	15.8	80.7		6.9	18.8	74.4		22.3	26.0	51.7		10.5	30.9	58.6	
16+	4.8	17.5	77.6		4.0	16.2	79.8		7.4	19.6	73.0		17.9	26.9	55.2		13.1	27.2	59.7	
Deferral				4.0				6.5*				0.1				2.0				49.5***
No	5.3	17.0	77.7		4.1	15.7	80.2		7.1	18.6	74.3		20.2	26.6	53.2		11.8	28.4	59.8	
Yes	9.2	17.0	73.8		8.5	13.5	78.0		7.7	17.6	74.6		22.8	21.3	55.9		30.2	33.1	36.7	

$*p < 0.05$; $**p < 0.01$; $***p < 0.001$.

TABLE 2 Predictors of a high intention to return for further donations

	Inexperienced donors (0–4 donations)		Experienced donors (5–15 donations)		Very experienced donors (16+ donations)		All donors	
	Adjusted odds ratio[a]	Confidence interval	Adjusted odds ratio[a]	Confidence interval	Adjusted odds ratio[a]	Confidence interval	Adjusted odds ratio[a]	Confidence interval
"During the blood donation, sufficient distance to other donors was ensured."[b]	0.97	0.70–1.32	0.73	0.40–1.31	0.95	0.66–1.38	0.90	0.73–1.12
"I felt safe at the donation appointment."[b]	1.06	0.74–1.52	1.38	0.73–2.62	1.48	1.01–2.18	1.33	1.05–1.68
"I found the temperature measurement at the entrance to be adequate."[b]	1.22	0.95–1.57	0.97	0.68–1.39	1.13	0.86–1.47	1.06	0.91–1.24
"I have received sufficient information on how to deal with the Corona virus."[b]	0.93	0.76–1.15	1.23	0.94–1.62	1.13	0.90–1.42	1.08	0.94–1.23
"Overall, how satisfied were you with your last blood donation appointment?"[c]	1.80	1.46–2.22	1.46	1.10–1.94	1.68	1.36–2.08	1.67	1.47–1.90

Note: Results of an ordinal logistic regression model among inexperienced, experienced and very experienced donors.
[a]Odds ratios adjusted for sex, age, education and donor deferral.
[b]A 5-point Likert scale was offered ranging from "totally disagree (1)" to "totally agree (5)."
[c]A 5-point Likert scale was offered ranging from "very dissatisfied (1)" to "very satisfied (5)."

as among female donors (60.1%), a high proportion of donors wanted to support the health care system through blood donation. The medical assessment of blood values (27.8%) and the doctor's consultation (10.0%) also motivated some donors, mainly older donors. An HIV test, however, was only a motive for very few donors to come to donate (4.1%). Among younger and thus less experienced donors, invitations by friends and relatives were very important (30.5%). Among older donors, many reported that they felt physically better after donating blood and therefore came to donate (42.1%).

The majority of donors (77.5%) were very satisfied with the compliance with the distance regulations during blood donation (Table 1, totally agree). The feeling of safety during donation and the acceptance of the temperature measurement at the beginning of the blood donation were also high. Thus, 80.1% of the donors reported that they felt very safe and 74.3% rated the additional temperature measurement at the entrance as appropriate. Subgroup analysis showed slightly lower scores on these questions only among men and young donors. Satisfaction with information about the novel virus, however, was lower. About 53.3% said they were very satisfied with the information about COVID-19 and 20.3% said they were dissatisfied. Again, the subgroup analysis showed that especially men and young donors would have liked more information. When asked about their overall satisfaction with the last donation experience, 58.9% indicated very high satisfaction. Dissatisfied donors were found mainly among men (13.3%), higher educated donors (12.6%) and deferred donors (30.2%).

The willingness to return to donate was very strong among the participants in the study. About 89.8% of donors reported that they were

very likely to return (response 5 on a 5-point Likert scale) and another 6.5% that they were likely to donate again (response 4 on a 5-point Likert scale). To describe correlations with donor satisfaction, a multiple ordinal logistic regression was estimated to explain a high intention to return (see Table 2). The regression model for all donors showed that overall satisfaction with the last donation experience was positively associated with the intention to return for further donations (OR: 1.67, CI: 1.47–1.90). Satisfaction with the different measures to avoid infection with the novel virus during blood donation was only relevant in one respect. The safer the donors felt during blood donation, the greater the intention to return to further donations (OR: 1.33, CI: 1.05–1.68). This association appeared to be significant under adjustment for all other characteristics considered. However, the subgroup analysis suggests that this does not apply to inexperienced donors. The regression model further showed a high intention to return among experienced (OR: 2.50, CI: 1.81–3.46) and very experienced donors (OR: 3.57, CI: 2.56–4.98), whereas donor deferral was associated with a low intention to return (OR: 0.39, CI: 0.25–0.61) (data not shown).

DISCUSSION

To describe motives, donation experiences and the intention to return of blood donors who donated at the beginning of the COVID-19 pandemic, we conducted a retrospective survey among German whole blood donors. Results show that more than half of the participating donors wanted to contribute to the fight against the pandemic by

donating blood. Most of the donors were satisfied with their last donation experience and felt safe during the blood donor appointment. However, some donors would have liked more information on how to deal with the pandemic. Intention to return for further donations was strongly associated with overall satisfaction with the last donation experience and the feeling of being safe during blood donation.

In line with a study from other European countries on donor motivation at the beginning of the pandemic [9], our survey showed that many donors felt motivated because of the pandemic. In particular, female donors and young donors showed a strong desire to contribute to overcoming the crisis by donating blood. The decline in blood donations in many countries at the beginning of the pandemic may therefore not be explained by a lack of willingness to help and solidarity among blood donors. The reduced number of mobile donation sites and the fear of infection among blood donors are more likely to be relevant for the low number of donations in the first weeks of the pandemic. This interpretation is consistent with the results obtained in the European study [9]. Potential donors who were worried about infection during blood donation were less likely to donate.

However, findings from the Netherlands show that new donors can be recruited even during a pandemic [14]. After intensive appeals via social media, a particularly large number of new donors were recruited. A high level of solidarity as well as test-seeking for COVID-19 have been discussed as possible explanations for this finding [14]. From our data, the tendency of greater interest in the results of the blood test or the doctor's consultation cannot be identified. Compared to a survey of German donors from Mecklenburg-Western Pomerania that was conducted before COVID-19 appeared [12], there were significantly lower proportions of respondents in our survey who wanted their blood tested (27.8% vs. 68.2%) or showed up to donate because of the doctor's examination (10.0% vs. 26.0%). Donor's interest in such results seems to be weaker rather than stronger, at least at the beginning of the pandemic. As the pandemic progressed, however, test-seeking behaviour for COVID-19 may have increased, as the Robert Koch Institute began testing 5000 randomly selected blood donations for antibodies every 14 days at the end of April 2020 [15]. Whether potential donors experienced these tests as an additional incentive to donate blood still needs to be clarified [14].

A very high acceptance and satisfaction were shown for the additional measures to avoid infection with the novel virus during blood donation. Body temperature measurement and ensuring physical distance were rated very positively and the majority of donors felt very safe during blood donation. However, not all donors felt sufficiently informed about the blood transfusion service's handling of the pandemic. These concerns reflect the general uncertainty of potential blood donors at the beginning of the pandemic, which has also been described in other studies [9, 16]. Blood transfusion services should therefore try to reduce donor uncertainty through appropriate communication campaigns and do not rely on threat scenarios in donor recruitment. There are examples from the current pandemic of how such communication campaigns can be designed [10, 17]. However, studies evaluating the effectiveness of different styles of communication during the pandemic are still not available.

The results of our ordinal logistic regression model describing predictors of the intention to return for further donations were consistent with previous studies. Experienced donors were more likely to report the intention to return for further donations, whereas donor deferral halves the odds of the intention to return [18, 19]. Overall satisfaction with the last donation experience also proved to be an important predictor of further donations, which has already been described in previous studies [20, 21]. Our analysis, however, also highlights new insights into the intention to return.

The already very high intention to return among donors of the German Red Cross Blood Donation Service seems to be even higher during the pandemic. While in a comparable study before the pandemic 92.2% of the donors stated that they were very likely or likely to return, the proportion in this study was 96.2% [22]. These results suggest that donors who donate during a pandemic might have a very strong connection to their blood service and are very easy to mobilise again. It may also have been important that we conducted our study among donors of the Red Cross, as they are often particularly altruistically motivated and highly committed [23]. The altruistic nature of donating blood to the Red Cross may have been further strengthened by the pandemic.

Furthermore, the feeling of safety during donation was shown to be a predictor of the intention to return for further donations. Although the importance of donor satisfaction for donor retention has been discussed in previous studies [24–26], the feeling of safety during donation seems to be particularly relevant in the context of a pandemic. Further studies should clarify what this feeling of safety depends on and how it can be increased especially among very experienced donors.

In this study, however, only the intention to return and not the actual donor return behaviour was surveyed. The intention to return positively correlated with donor return in previous studies [27, 28]. Interestingly, the extent of the match between intention and actual behaviour was well explained when the experience of the donors was taken into account [29]. However, little is known about donor intention and actual donor return during and after a pandemic. It must also be taken into account that our study was conducted retrospectively. Donors had to evaluate their experience up to 2 months after their donation, which may have led to recall bias. However, this bias should be rather small, as the first donation during the pandemic is expected to be very memorable. In addition, information is only available from 58.1% of the selected donors, which may have led to nonresponse bias. Compared to previous studies, however, the willingness to participate was high [22, 24] and the age structure of the participants largely corresponds to the donor population of the German Red Cross [30].

More than half of the blood donors who donated at the early phase of the pandemic wanted to contribute to the fight against the pandemic. Acceptance with the changed donation procedures was very high and the vast majority of donors felt very safe during the blood donation session. However, those donors who felt unsafe expressed a low intention to return. Blood donor services should adapt pre-donation information material and carefully monitor donor satisfaction of those who donated or intended to donate during a pandemic to avoid donor loss.

CONFLICT OF INTEREST

The authors declare that there are no conflicts of interest.

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REFERENCES

1. Glynn SA, Busch MP, Schreiber GB, Murphy EL, Wright DJ, Tu Y, et al. Effect of a national disaster on blood supply and safety: the September 11 experience. JAMA. 2003;289:2246–53.
2. Guo N, Wang J, Ness P, Yao F, Bi X, Li J, et al. First-time donors responding to a national disaster may be an untapped resource for the blood centre. Vox Sang. 2012;102:338–44.
3. Wang Y, Han W, Pan L, Wang C, Liu Y, Hu W, et al. Impact of COVID-19 on blood centres in Zhejiang province China. Vox Sang. 2020;115:502–6.
4. García-Erce JA, Romón-Alonso Í, Jericó C, Domingo-Morera JM, Arroyo-Rodríguez JL, Sola-Lapeña C, et al. Blood donations and transfusions during the COVID-19 pandemic in Spain: impact according to autonomous communities and hospitals. Int J Environ Res Public Health. 2021;18:3480.
5. Silva-Malta MCF, Rodrigues DOW, Chaves DG, Magalhães NNS, Ribeiro MA, Mourão Cioffi JG, et al. Impact of COVID-19 in the attendance of blood donors and production on a Brazilian blood centres. Transfus Med. 2020;31:206–12.
6. Mohammadi S, Tabatabaei Yazdi SM, Eshghi P, Norooznezhad AH. Coronavirus disease 2019 (COVID-19) and decrease in blood donation: experience of Iranian Blood Transfusion Organization (IBTO). Vox Sang. 2020;115:595–6.
7. Politis C, Richardson C, Hassapopoulou-Matamis H, Politi L, Hatziagapiou K, Grouzi E, et al. Strategies for blood collection and optimization of the blood supply chain during the COVID-19 pandemic in Greece. ISBT Sci Ser. 2020;15:386–92.
8. Franchini M, Farrugia A, Velati C, Zanetti A, Romanò L, Grazzini G, et al. The impact of the SARS-CoV-2 outbreak on the safety and availability of blood transfusions in Italy. Vox Sang. 2020;115:603–5.
9. Chandler T, Neumann-Böhme S, Sabat I, Barros PP, Brouwer W, Exel J, et al. Blood donation in times of crisis: early insight into the impact of COVID-19 on blood donors and their motivation to donate across European countries. Vox Sang. 2021. https://doi.org/10.1111/vox.13103
10. Küpper SD, Müller C. Ruhig Blut? Blutspenden in Zeiten von SARS-CoV-2. Hämotherapie. 2020;35:32–3.
11. Müller O, Lu G, Jahn A, Razum O. COVID-19 control: can Germany learn from China? Int J Health Policy Manag. 2020;9:432–5.
12. Suemnig A, Konerding U, Hron G, Lubenow N, Alpen U, Hoffmann W, et al. Motivational factors for blood donation in first-time donors and repeat donors: a cross-sectional study in West Pomerania. Transfus Med. 2017;27:413–20.
13. Ferguson E, Taylor M, Keatley D, Flynn N, Lawrence C. Blood donors' helping behavior is driven by warm glow: more evidence for the blood donor benevolence hypothesis. Transfusion. 2012;52:2189–200.
14. Spekman MLC, Ramondt S, Quee FA, Prinsze FJ, Huis in 't Veld EMJ, Hurk K, et al. New blood donors in times of crisis: increased donation willingness, particularly among people at high risk for attracting SARS-CoV-2. Transfusion. 2021;61:1822–9.
15. Poethko-Müller C, Prütz F, Buttmann-Schweiger N, Fiebig J, Sarganas G, Seeling S, et al. German and international studies on SARS-CoV-2 seroprevalence. J Health Monit. 2020;5:1–15.
16. Tagny CT, Lendem I, Sack FN, Balogog PN, Ninmou C, Dongmo A, et al. Trends in blood donations, blood donors' knowledge, practices and expectations during the COVID-19 pandemic in Cameroon. Vox Sang. 2020;116:637–44.
17. Waheed U, Wazeer A, Saba N, Qasim Z. Effectiveness of WhatsApp for blood donor mobilization campaigns during COVID-19 pandemic. ISBT Sci Ser. 2020;15:378–80.
18. Clement M, Shehu E, Chandler T. The impact of temporary deferrals on future blood donation behavior across the donor life cycle. Transfusion. 2021;61:1799–808.
19. Spekman MLC, van Tilburg TG, Merz E-M. Do deferred donors continue their donations? A large-scale register study on whole blood donor return in The Netherlands. Transfusion. 2019;59:3657–65.
20. Nguyen DD, Devita DA, Hirschler NV, Murphy EL. Blood donor satisfaction and intention of future donation. Transfusion. 2008;48:742–8.
21. Bagot KL, Murray AL, Masser BM. How can we improve retention of the first-time donor? A systematic review of the current evidence. Transfus Med Rev. 2016;30:81–91.
22. Weidmann C, Müller-Steinhardt M, Schneider S, Weck E, Klüter H. Donor satisfaction with a new german blood donor questionnaire and intention of the donor to return for further donations. Transfus Med Hemother. 2013;40:356–61.
23. Healy K. Embedded altruism: blood collection regimes and the European Union's donor population. Am J Sociol. 2000;105:1633–57.
24. Boenigk S, Leipnitz S, Scherhag C. Altruistic values, satisfaction and loyalty among first-time blood donors. Int J Nonprofit Vol Sector Market. 2011;16:356–70.
25. Melián-Alzola L, Martín-Santana JD. Service quality in blood donation: satisfaction, trust and loyalty. Serv Bus. 2020;14:101–29.
26. Merz E-M, Zijlstra BJH, de Kort WLAM. Blood donor show behaviour after an invitation to donate: the influence of collection site factors. Vox Sang. 2017;112:628–37.
27. Masser BM, White KM, Hyde MK, Terry DJ, Robinson NG. Predicting blood donation intentions and behavior among Australian blood donors: testing an extended theory of planned behavior model. Transfusion. 2009;49:320–9.
28. Masser BM, Bednall TC, White KM, Terry D. Predicting the retention of first-time donors using an extended theory of planned behavior. Transfusion. 2012;52:1303–10.
29. Sheeran P, Godin G, Conner M, Germain M. Paradoxical effects of experience: past behavior both strengthens and weakens the intention-behavior relationship. J Assoc Consum Res. 2017;2:309–18.
30. Müller-Steinhardt M, Weidmann C, Klüter H. Changes in the whole blood donor population in south-west Germany: 2010 versus 2016. Transfus Med Hemother. 2017;44:217–23.