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# Completing the Donor History Questionnaire before the Donation Visit Can Improve Blood Safety

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**Keywords**

Donor history questionnaire · Deferral rate · Donor selection · Blood safety · Transfusion-transmitted infections

**Abstract**

***Background and Objectives:*** In Germany, the donor history questionnaire (DHQ) is traditionally filled in at the donation center to avoid any influence of others. Since March 2020, it has been suggested to donors to answer the DHQ already at home and to call if they have any concerns to reduce the number of ineligible donors on-site during the COVID-19 pandemic. ***Materials and Methods:*** We evaluated the rate of ineligible donors before and after March 2020. Additionally, an anonymous online survey asking for the donors' attitude towards the DHQ was performed. It included questions on whether and for what reason the DHQ had been answered incorrectly in the past. ***Results:*** The rate of ineligible donors decreased by 27% (from 7.1% to 5.2%). In total, 5,556 of 10,252 invited donors completed the survey (54.2%). 88.6% reported either going through the DHQ at home or knowing all questions from their previous donations. 444 donors (8.0%) had at least once postponed a donation after reading the DHQ at home. 68 donors (1.2%) admitted having intentionally provided false answers in the past (9 at home, 43 on-site, 14 both, 2 unknown). Not wanting to be rejected once arriving at the donation center was an important motivation for 42% of donors answering incorrectly on-site. Details on 46 incorrect answers were provided: only 17 had no influence on donor eligibility or product quality. In 5 cases, some blood products might have had impaired quality. Truthful answers to 17 questions would have led to deferral, mostly due to increased risk for unrecognized viral infections transmitted by sexual contacts. For a further 7 questions, there was insufficient information available to determine possible consequences. Asked about their general opinion, 753 (13.6%) of all donors estimated the risk of incorrect answers being greater on-site, while 239 (4.3%) presumed an increased risk at home. ***Conclusion:*** Answering the DHQ prior to a donation visit prevented ineligible donors from visiting the donation center. Furthermore, it might improve honesty, as the discomfort of being deferred after arriving at the donation center was an important reason to answer incorrectly. Overall, there was no increased risk of donor or product safety, and potentially even a benefit.



## Introduction

Donor history questionnaires (DHQs) are an important tool to ensure that donors are in good health and free from transfusion-transmitted infections. While many blood centers in the United States and Canada have adopted an electronic questionnaire, which may be filled in at home on the day of donation, the DHQ is answered at the donation site in most German centers. Directly prior to donation, the DHQ is reviewed by a trained donor interviewer, and donors with an increased risk of donor health and/or transfusion-transmitted infections are deferred.

At the beginning of the COVID-19 pandemic, we intended to reduce the number of concurrent potential do-

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nors without impacting the blood supply. One aim was to recognize ineligible donors in advance and prevent them from visiting the donation site. Therefore, we adapted procedures common, for example, in the United States and offered donors the option to fill in the DHQ at home. Already having filled in the DHQ at home also reduces the donors' stay in the waiting area, which further minimizes the number of donors attending the donation center concurrently. Immediately prior to the donation, the DHQ is reviewed by a qualified health professional at the donation center and the donors sign their DHQ to confirm that all answers are correct and still up-to-date.

This procedure was accepted by the regional authority of the German federal state of Schleswig-Holstein (State Social Services Agency Schleswig-Holstein) as an appropriate exception from the guidelines [1] during a pandemic situation. However, completing the DHQ prior to arrival at the donor center could be advantageous even under ordinary circumstances: it has been assumed that answering the DHQ on-site in a confidential manner minimizes the temptation to provide an intentionally false answer. A donor, however, may feel social pressure to donate from those on-site – including friends, family, or co-workers – and may be tempted to provide false information to hide a deferrable response. On the other hand, the donor may feel more inclined to provide true responses if able to fill in the DHQ at a more private time prior to visiting the donation center. Being confronted with the DHQ questions in a more private environment may allow the individual to come up with a socially acceptable reason for not donating that does not threaten to reveal behavior they may wish to not disclose publicly. We thus decided to use the operational decision of suggesting to donors to complete the DHQ prior to arrival during the COVID-19 pandemic as an opportunity to evaluate the impact of this measure on deferral rates and donor and product safety.

## Materials and Methods

*Blood Center*

The University Hospital of Schleswig-Holstein is the only university hospital in the German federal state of Schleswig-Holstein consisting of two large hospitals in the cities of Kiel and Lübeck. The Institute of Transfusion Medicine operates a total of three blood donation centers in these cities and provides the hospitals with red blood cell concentrates, plasma, and platelet concentrates (both pooled and apheresis platelets). Donors receive a fixed monetary allowance to reimburse them for their expenses.

*Donor History Questionnaire*

The DHQ is available via the blood donation center's website as a fillable and printable pdf along with educational materials about donor eligibility. While making an appointment, donors receive advice on the DHQ and it is suggested that they contact the blood donation center by phone or email if they answer any question with "yes." Thus, we aim to clarify whether the donors' anamnestic information impacts eligibility before they arrive at the donation department. Nevertheless, donors are also allowed to use the traditional approach and fill in the DHQ at the donation department.

*Proportion of Ineligible Donors*

The proportion of ineligible donors out of all donors presenting at one of the three donation sites of the Institute of Transfusion Medicine was evaluated during the 12 months before and after providing the DHQ already prior to arriving on-site (March 2019 to February 2020 vs. April 2020 to March 2021). It comprised all deferrals, including deferrals for hemoglobin and vital signs. The results were also evaluated separately for first-time and repeat donors (donors who had donated at our donation service already previously).

*Online Survey*

The online survey was conducted between December 2020 and April 2021. All donors having donated at least once in 2020 with a known email address were sent an email with a personalized link asking them to take part in an anonymous online survey about the DHQ. The survey was conducted using the program LimeSurvey (LimeSurvey GmbH, Hamburg, Germany) installed on an external server operated by the University of Lübeck. The personalized link could only be used to complete the survey once. Answers were anonymized directly and not saved in connection with the personalized link. If donors did not complete the survey, it was possible to start the survey tool again. Therefore, to exclude multiple answers from the same donor, only completed surveys were evaluated.

The survey included questions on whether and for what reason the donors had answered a question of the DHQ incorrectly. All questions concerning the donors' motivation had 6-point Likert scales: very true – true – somewhat true – somewhat wrong – wrong – very wrong. Donors had the option to skip questions they did not like to answer, so the number of evaluable answers differs slightly between questions.

## Results

*Proportion of Ineligible Donors*

The proportion of ineligible donors fluctuated between 5.4% and 9.2% per month in the 12 months before providing the DHQ directly after booking a donation appointment (March 2019 to February 2020), and between 3.8% and 6.8% per month in the first year after the change (April 2020 to March 2021). The mean proportion of ineligible donors decreased by 27% from 7.1% during the preceding 12 months to 5.2% thereafter (absolute difference 1.9 % points). Deferral rates were generally higher in first-time donors than in repeat donors (21.8% vs. 5.2% before March 2020 and 14.8% vs. 3.8% after March 2020), but showed a marked reduction in both groups after March 2020 (by 32% for first-time donors and by 26% for repeat donors, absolute differences 7.0% points and 1.4% points, respectively, see Fig. 1 for details).

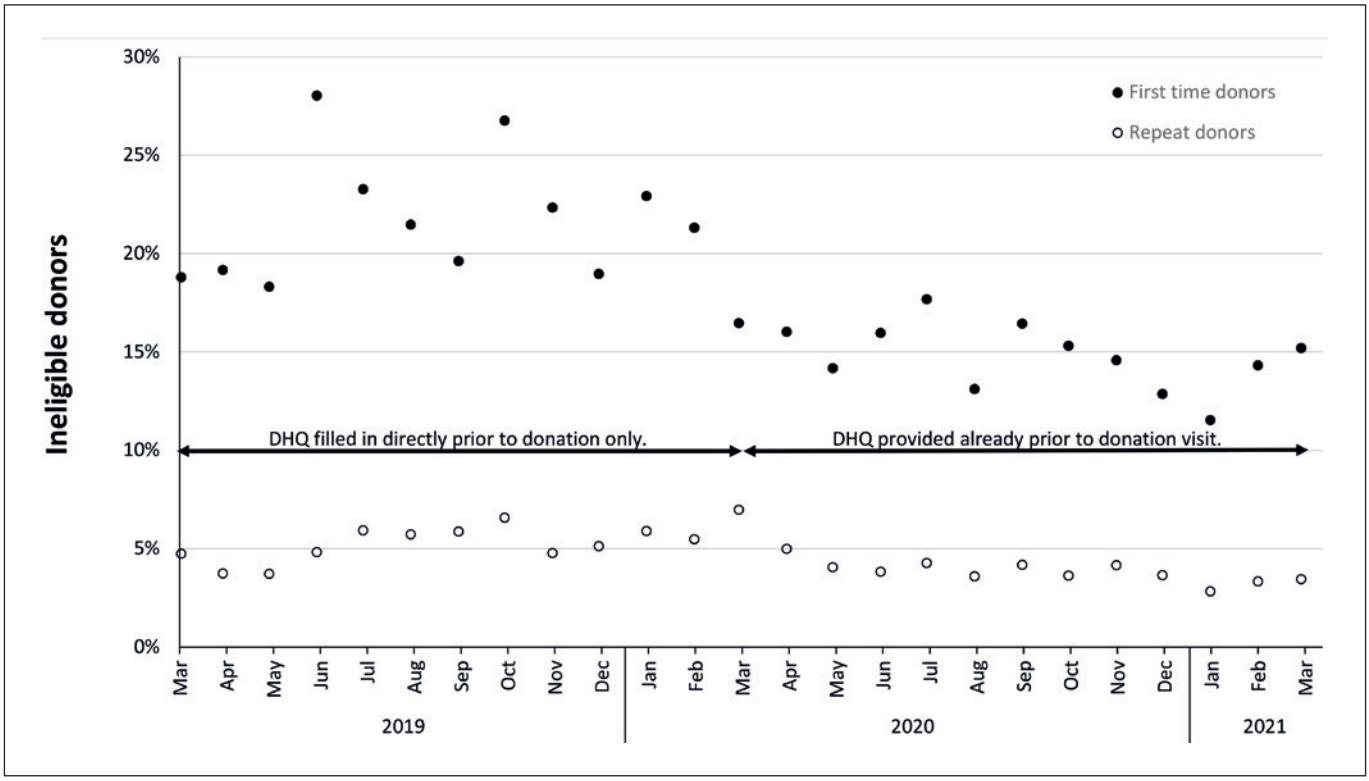


**Fig. 1.** Since March 21, 2020, the donors are asked to fill in the donor history questionnaire (DHQ) already prior to arrival for their donation visit. The figure shows a distinctly lower proportion of ineligible donors presenting at the donation center during the 12 months after March 2020 compared to the 12 months previous to the change. The deferral rates shown include all deferrals (e.g., both deferrals due to the donors' anamnesis, as well as low hemoglobin or aberrant vital signs).

*Online Survey*

An email address was available for 10,252 out of all 14,094 active donors at our institute (73%). All these donors were invited to take part in the online survey. 5,556 out of the 10,252 invited donors completed the survey (54.2% of invited donors or 39.4% of all active donors). Compared to all active donors of our institute, participating donors were slightly older and more likely to be female and repeat donors (Table 1).

Asked about their opinion on the DHQ, 89.0% found it easy to fill in the DHQ at home, while 11.0% did not. 77.7% would like to permanently maintain the option of filling in the DHQ while still off-site.

3,292 donors (59.3%) answered that they would fill in the DHQ at home. A further 228 donors (4.1%) read the DHQ but did not fill it in beforehand, and 2,036 donors (36.6%) did not read the DHQ before being at the donation center and filled in the DHQ on-site (see Fig. 2). The most important group not answering the DHQ at home were regular donors already knowing all questions from their previous donations: 1,404 of the 2,036 donors not reading the DHQ at home (69.0% of these donors or 25.3% of all donors, respectively) reported this reason as very true, true, or somewhat true. So, a total of 88.6% of donors reported either going through the DHQ at home or knowing the questions without reading the DHQ. Further motivations for not answering the DHQ at home are given in Figure 3.

444 out of 3,520 donors reading the DHQ at home (12.6% of these or 8.0% of all donors, respectively) at least once postponed a donation visit after reading the DHQ. 188 of these 444 donors recognized on their own that they were ineligible, the other 256 donors consulted the donation center after going through the DHQ and were advised to reschedule their visit.

**Table 1.** Characteristics of donors answering the survey compared to all active donors

| | All active donors | Donors answering the survey | *p* |
|---|---|---|---|
| Age, years | 38.3±13.9 | 43.1±14.2 | <0.001 |
| Females | 6,726 (47.8%) | 2,926 (52.6%) | <0.001 |
| Males | 7,357 (52.2%) | 2,639 (47.4%) | |
| First-time donors | 5,223 (37.1%) | 1,383 (24.9%) | <0.001 |
| Repeat donors | 8,860 (62.9%) | 4,173 (75.1%) | |

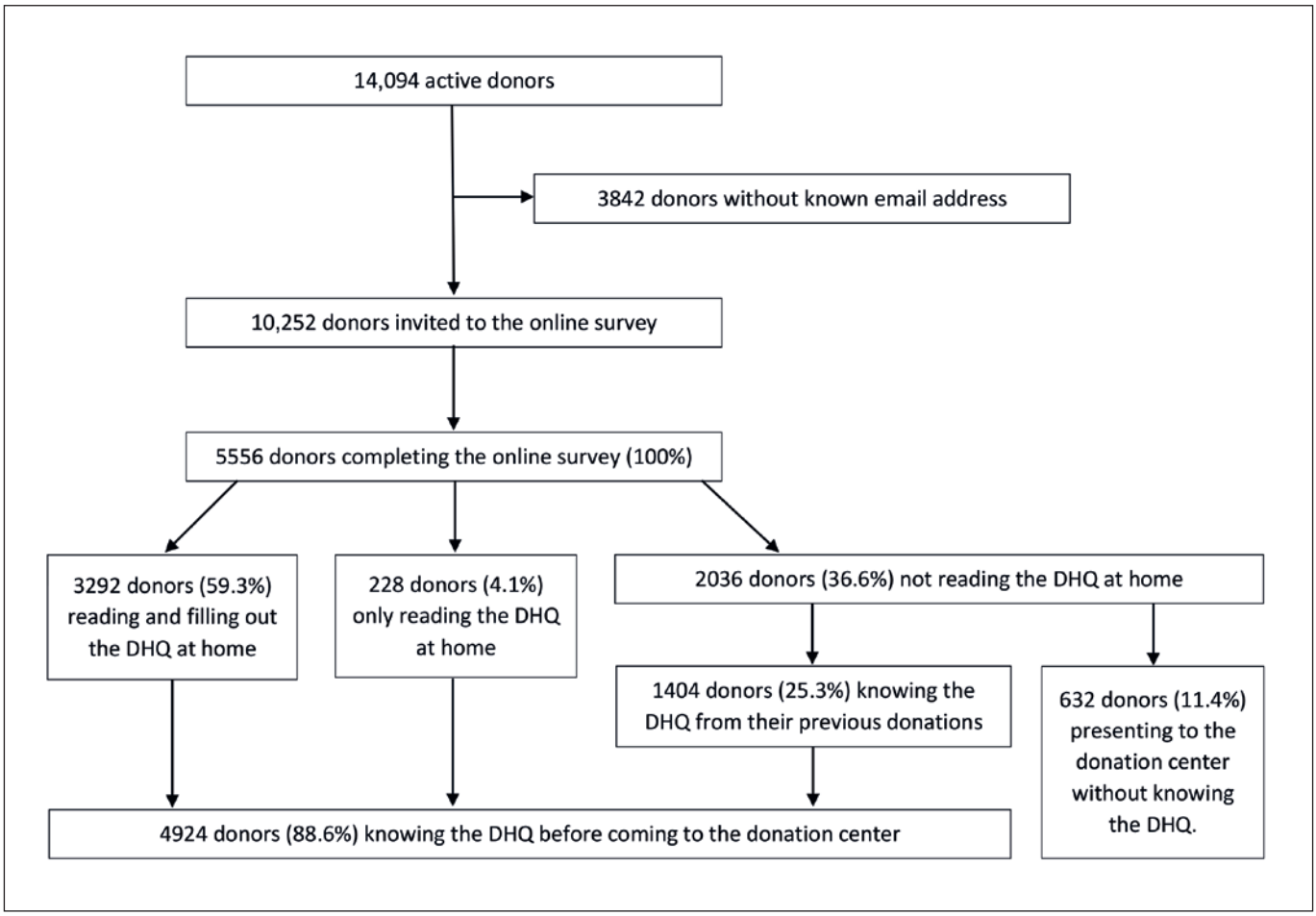


**Fig. 2.** Flow chart of donors participating in the online survey and survey results concerning time and place of reading the donor history questionnaire (DHQ).

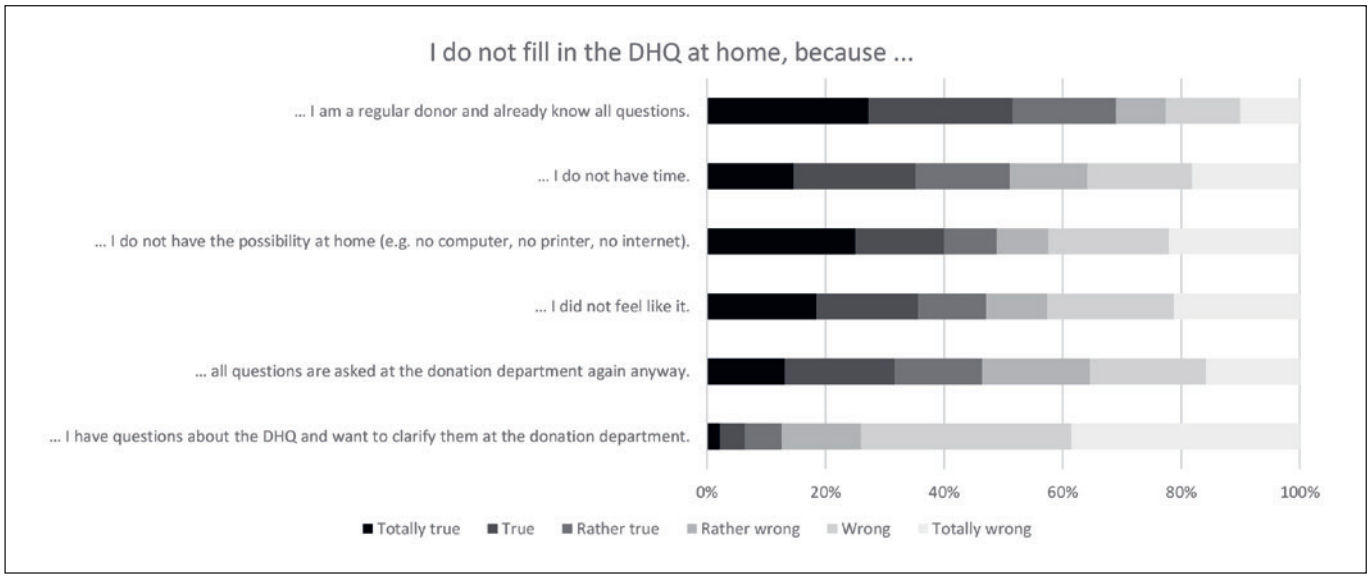


**Fig. 3.** Motivations of the 2,036 donors reporting not reading the donor history questionnaire (DHQ) at home.

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**Table 2.** Overview of incorrectly answered questions and the presumed eligibility if the donors had answered correctly[a]

| Intentionally incorrectly answered question | Donors, *n* | Presumed eligibility | Comment |
|---|---|---|---|
| Have you ever taken drugs? | 10 | Eligible | Mostly cannabis taken months to years ago |
| Did you drink alcohol within the last 12 hours? | 4 | Eligible | Only small amounts of alcohol |
| Have there been any complications with the previous donation? | 1 | Eligible | No comment |
| Have you been to a doctor in the last 4 months? | 1 | Eligible | No comment |
| Did you suffer from gonorrhea ("tripper")? | 1 | Eligible | Donor had gonorrhea many years ago |
| Have you taken any medication within the last 4 weeks? | 4 | Eligible, but perhaps impaired quality of some blood products | Probably analgetics. Depending on the interval to donation, the buffy coat should not be used for pooled platelet concentrates |
| Have you ever been pregnant? If yes, when last time? | 1 | Eligible, but perhaps impaired quality of some blood products | Testing for antibodies against red blood cells should be performed before issuing pooled platelets or plasma units |
| Have you been abroad during the last 6 months? | 4 | Unclear | Depending on country |
| Did you have mononucleosis (glandular fever)? | 1 | Unclear | Depending on time of infection |
| Do you suffer from any other organ disease? | 1 | Unclear | Depending on disease |
| Have you been to a dentist? | 1 | Unclear | Depending on dentist's treatment |
| Question about sexual intercourse (not further specified) | 4 | Ineligible | No comment |
| Have you had a tattoo in the last 4 months? | 3 | Ineligible | No comment |
| Have you ever had sexual intercourse with another man? If so, has this contact taken place within the last 12 months? | 3 | Ineligible | No comment |
| Have you had any sexual intercourse in the last 12 months with more than 3 partners? | 2 | Ineligible | No comment |
| Have you had sexual intercourse in the last 4 months outside a committed partnership? | 2 | Ineligible | No comment |
| Have you had sexual intercourse in the last 4 months with a person who was born or lived abroad for more than 6 months? | 1 | Ineligible | No comment |
| Have you had an endoscopy in the last 4 months? | 1 | Ineligible | No comment |
| Are you on sick leave? | 1 | Ineligible | No comment |

[a]Forty of 68 donors admitting dishonest answers reported details on the questions concerned. As some donors reported false answers to several questions, totally, 46 questions are listed.

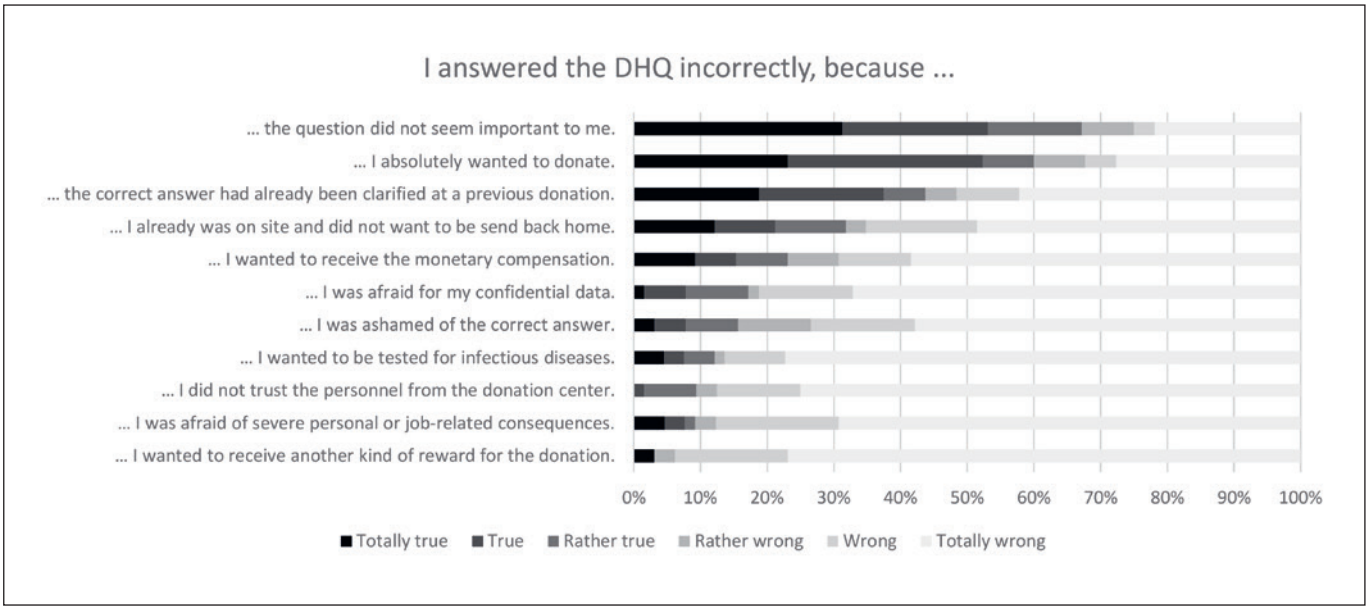


**Fig. 4.** Motivations for incorrect answers in the donor history questionnaire (DHQ) according to the online survey (multiple answers were possible). 65 donors provided reasons why they answered the DHQ incorrectly in the past.

68 donors (1.2%) admitted to intentionally giving false answers in the past. 9 of these donors gave the wrong answer while filling in the DHQ at home, 43 in the donation center, 14 both at home and in the donation center, and 2 donors did not report where they had given the wrong answer. 40 of the 68 donors (59%) provided details on the incorrect answer (7 who were untruthful at home, 29 at the donation center, and 4 who answered incorrectly both at home and at the donation center). As some donors reported several incorrectly answered questions, totally, 46 questions were answered dishonestly by these 40 donors (Table 2).

Truthful answers to 17 questions would have led to deferral, mostly due to an increased risk of unrecognized viral infections transmitted by sexual contacts. For a further 7 questions, there was insufficient information available to determine whether the donors would have been eligible. The most frequently undisclosed information in this category was travelling abroad. Depending on the country visited, these donors should have postponed their donation due to increased risk for viral infections or risk of malaria transmission. In 5 cases, the donor would have been eligible, but some blood products might have had impaired quality (e.g., the buffy coat should not be used for production of pooled platelet concentrates if the donor reported the intake of analgetics shortly before donation). Only 17 dishonest answers had presumably no consequences on donor eligibility or product quality (37% of intentionally incorrect answers). The overwhelming majority of incorrect answers not leading to consequences were concealed consumption of cannabis months to years before donation and consumption of low amounts of alcoholic beverages on the evening before donation. None of the donors who gave false answers used the possibility of confidential self-exclusion.

When asked about their motivation to provide incorrect answers, the most prominent reasons were an absolute will to donate (60% indicated this reason as being very true, true, or somewhat true) and a subjective feeling that the question was not important (67%). 44% of donors reported that the correct answer had already been judged as unimportant for their eligibility at the occasion of a previous donation. Unfortunately, most of these donors did not report enough details to confirm their estimation. However, there was no donor who clearly had misunderstood information given at a previous donation.

Not wanting to be deferred once having come to the donation center was also a very important reason to be dishonest (Fig. 4): 32% of all donors answering incorrectly and 42% of donors answering incorrectly on-site indicated this reason as being very true, true, or somewhat true.

Wanting to receive the monetary compensation was indicated as being very true, true, or somewhat true by 28% of donors answering the DHQ incorrectly on-site, but by none of the donors answering incorrectly at home.

When asked about their general opinion whether the risk of giving false answers in the DHQ would be greater at home or at the donation center, 4,564 donors (82.1%) felt that it did not make a difference, 753 donors (13.6%) estimated the risk of answering the DHQ incorrectly as being greater at the donation center, while only 239 donors (4.3%) presumed an increased risk at home.

## Discussion

After introducing the option of filling in the DHQ already at home prior to a planned donation visit, the proportion of ineligible donors coming to the donation center dropped by 27% from a median rate of 7.1% during the year prior to the change to a median rate of 5.2% thereafter. This difference is in line with the finding of 12.6% of donors actually going through the DHQ at home having postponed a planned donation visit at least once after reading the DHQ.

More importantly, filling in the DHQ at home may have prevented some donations of otherwise unrecognized ineligible donors, as not wanting to be deferred once having come to the donation center was an important reason to be dishonest for 42% of donors giving incorrect information while filling in the DHQ on-site. The majority of incorrectly answered questions, which would have led to deferral of the donor if answered honestly, concerned sexual contacts associated with an increased risk of transmission of viral diseases. It is easy to imagine that it could be hard for donors to explain a deferral due to sexual risk behavior to friends or even partners accompanying them to the donation center. Such problematic situations can now be avoided by more than 88% of donors actually filling in the DHQ at home or knowing all questions from their previous donations.

In a Dutch study, 1,353 donors with transfusion-transmissible infections underwent posttest counseling to identify any risk factors missed during the routine selection procedures. Overall, 258 donors (19%) reported noncompliance with the DHQ. The frequency of noncompliance differed according to infection between 10% for hepatitis B virus and 38% for HIV [2]. These frequencies are similar to the results of an Australian study of 1,449 donors repeatedly reactive for transfusion-transmissible viral infections, in which 21% of donors would have been deferred if all risk factors had been disclosed correctly [3]. Evaluation of all HIV- or hepatitis C virus-infected blood donors in Germany with recorded transmission risks between 2006 and 2013 by the Robert Koch Institute (RKI), Germany's federal public health institute, showed that complete identification of sexual risk contacts might even prevent acceptance of about 73% of HIV-infected donors [4]. Therefore, improved honesty in answering the DHQ should lead to a decreased risk of transfusion-transmissible viral infections.

Issues of "privacy" and "discomfort" associated with disclosure of not generally accepted behavior were reported by others as possible reasons for incorrect answers in the DHQ [5]. In our study, however, such motivations were named rather infrequently compared to not wanting to be sent back home. Filling in the donor questionnaire at home does not necessarily guarantee a confidential atmosphere. Therefore, it is important that donors are also allowed to answer the DHQ at the donation facility. If donors have the choice to either fill in the DHQ at home or at the donation facility, they can choose the place which is most convenient for them in their specific situation (e.g., in terms of confidentiality). This should increase both donor satisfaction and compliance with the DHQ.

About two-thirds of donors believed that the question they answered incorrectly was not important for blood safety. This common reliance on one's personal risk estimation is in line with the finding of a Canadian study where 4.7% of the general donor population tended to believe that it is OK not to answer truthfully if one believes that one's blood is safe [6]. This belief was even more common among hepatitis C virus-positive donors having concealed their history of intravenous drug use (between 19% and 40%) [6, 7].

The proportion of donors admitting incorrect answers was lower in the current study (1.2%) compared to the rate of noncompliance reported in studies from Hong Kong (5%) [8] and Australia (1.65%) [9], especially as only noncompliance with sexual risk behavior and intravenous drug use was evaluated in these studies. An important difference from the studies from Hong Kong and Australia is that computerized questionnaires distinct from the DHQ were used to examine risk behavior. This approach made it possible to identify risks even in donors who were not aware that they had answered the DHQ incorrectly, while in our study only intentionally incorrect answers were evaluated.

The same difference applies also to the interesting study of Melanson et al. [10], who performed a serum toxicology analysis in samples from 108 blood donors, detecting unreported medication in 12 of them (11%). Intentionally omitting medication in the DHQ was reported by only 4 donors in our study. As only 59% of donors provided details on the incorrectly answered question, however, the actual frequency of underreporting medication could be higher.

Our study was designed to detect the influence of filling in the DHQ at home already prior to the donation visit versus filling in the DHQ at the donation center. Improving the effectiveness of specific questions or the DHQ as a whole to enable more reliable detection of risk behavior [11] is beyond the scope of this study. Some questions were very broad originally (e.g., "Have you ever taken drugs?") and have been replaced by more specific wording in the meantime. Several studies showed that computerized donor interviews are effective in improving detection of risk factors, amongst others due to the possibility of question branching or automated con-

sistency and range checking [12]. Providing web-based computerized interviews before a donation visit could combine these advantages with a private environment and prevention of the pressure of already being at the donation center.

An important limitation of our study is that introducing the option of filling in the DHQ at home was not the only change influencing donor deferral rates. Due to the COVID-19 pandemic, travel restrictions and repeated lockdowns have been imposed during several periods since March 2020. This should, for example, have reduced the proportion of donors with some kinds of deferrable risks, such as travel abroad, tattoos, or even sexual contact with nonsteady partners [13]. Nevertheless, 8% of donors taking part in the survey reported having postponed a planned donation visit after reading the DHQ at home. So, providing the DHQ already prior to arriving on-site definitely prevented ineligible donors from coming to the donation center. The magnitude of this effect should of course be reevaluated after termination of the pandemic situation.

Inviting only donors with an available email address to the online survey could introduce a bias, especially concerning satisfaction with an electronically provided DHQ. Actual satisfaction rates in the total donor population might, therefore, be lower. On the other hand, an email address was available for 73% of our donors, and general donor characteristics such as age or gender were comparable between donors answering the survey and the general donor population.

Conclusively, completing the DHQ already beforehand and checking whether all answers are still up-to-date at the donation center is feasible. Most donors find it easy to answer the questions at home and would like to maintain this option. 8% of donors taking part in the survey postponed a planned donation visit after going through the DHQ at home, which reduced the rate of ineligible donors presenting at the donation center. The greatest benefit of filling in the DHQ at home might be an increased infection safety of blood products, as the discomfort of being deferred once already having come to the donation center is an important reason to answer the DHQ dishonestly. Whether this potential benefit actually leads to increased blood safety has to be verified by future, larger studies also including objective safety data such as numbers of donors tested positive for hepatitis virus or HIV.

## Statement of Ethics

The ethics committee of the University of Lübeck was notified about this study. It waived the need for formal approval and informed consent (reference number 21-440).

## Conflict of Interest Statement

The authors report no conflicts of interest.


## Funding Sources

No specific funding for this study was received.


## Data Availability Statement

The data that support the findings of this study are available from the corresponding author (M.Z.) upon reasonable request.

## Author Contributions

M.Z. and S.G. designed the research. S.O.S. and D.S. introduced the online DHQ. J.N., C.H., and C.B. designed and performed the online survey. J.N., D.J., and M.Z. evaluated the survey results and eligibility data. M.Z. wrote the manuscript. All authors refined the manuscript and approved the final version.

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