

Gender differences in giving blood: a review of the literature

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Background. An overview of European blood donors shows that the distribution of men and women donors is similar in many countries, with Italy being an exception in that women account for only 30% of donors. Gender medicine is a key issue in this context, even though gender studies are very limited in the transfusion field, whether considered broadly or with specific regards to the selection, management and retention of donors. It, therefore, seemed important to compare the presence of women among blood donors in different European countries and examine the roles that gender is reported to play in the donation of blood in order to identify possible implications for communication with and management of the donor.

Methods. To determine the proportion of women among donors in European countries, data were collected from annual reports or documents available on the websites of national associations; furthermore, all papers related to giving blood published in the five main journals in the sector (Transfusion, Vox Sanguinis, Transfusion and Apheresis Science, Transfusion Medicine, Blood Transfusion) were considered; about 80 publications were selected and the gender variable was examined.

Results. The published studies showed that gender plays key roles in the motivation to give blood (women being more altruistic, men being more individualistic) and in adverse reactions, which was a particularly critical problem leading to fewer women become regular donors. A few aspects specific to the management of donors in Italy also emerged.

Discussion. Gender seems to play an important role in the aspects studied and does, therefore, merit further consideration in relation to strategies to recruit donors and the management of critical events during donation.

Key words: donation, blood, gender differences.

Introduction

There has been growing interest in gender differences in medicine in the last decade as progresses in the medical field showed important differences between the sexes with regards to aetiopathogenesis, clinical features and response to treatment in various disorders¹.

One of the first contributions was made in 1991 with the definition of the "Yentl syndrome" which described the discriminatory behaviour of cardiologists against female patients with coronary

artery disease, who received qualitatively inferior care².

The concept of health was, therefore, expanded to include a new dimension, gender, which not only has genetic and physiological implications, but also psychological, cultural and social ones. This dimension is, therefore, understood as the totality of the personality traits, habits, feelings, values, behaviours and activities that society differentially attributes to the two sexes. The multidisciplinary application of this concept contributed to the birth of

Gender Medicine and, in 2008, to the creation of the Italian Society of Gender Health and Medicine³, which has the purpose of encouraging the development of a culture that takes into account gender differences in all fields of health services, stimulating a specific, scientific approach and systematic attention to this new area of biomedical research.

Since the beginning of Gender Medicine, which evaluates the implications that the social conception of diversity in biological sex can have on health and disease, numerous disciplines have tried to apply this concept to strictly biomedical fields (biology, genetics, internal medicine, cardiology, pharmacology, endocrinology, nephrology, orthopaedics, epidemiology, gynaecology, psychiatry and psychotherapy) as well to areas of social studies (anthropology, sociology). In contrast, there is a paucity of gender studies in the transfusion sector in a broad sense: this is true both with regards to the effect of gender on raising awareness among potential donors, the selection and management of donors, and promotion of repeat donations, and with regards to whether blood components collected from a man or a woman may have different effects on recipients.

Voluntary donation of blood is currently the main source of the whole blood and blood derivatives necessary in numerous settings in health care. AVIS, the principal Italian association of volunteer blood donors, promotes the voluntary and free donation of blood and blood derivatives, with no distinction according to sex, race, language, nationality, religion or political beliefs (article 2/1); despite this, a substantial inequality has emerged between the proportions of male and female periodic donors in Italy.

Although reliable national data are not available on this issue, given the difficulty in collecting information from some regional institutions, in Lombardy women account for about 32% of active donors, whereas the other 68% are males⁴. The data are the same in Veneto and very similar in Tuscany (33%, 67%)^{5,6}, whereas 30.2% of the donors in Trentino are women⁷. Since these regions represent about 38% of Italian donors, a reasonable estimate of the percentage of female donors at a national level is about 32%.

Outside Italy, the data from other European countries seem to show a different picture, with

women playing a more substantial role: in Spain 46% of the donors are women⁸, in Portugal 43%⁹, in Belgium 45.4%¹⁰, in the Netherlands 50%¹¹, in Denmark 50%¹², in France 50%¹³, in the United Kingdom 53%¹⁴, and in Finland 55%¹⁵. Greece is the only European country in which the percentage of female donors, 33%, is similar to that in Italy; it does not, however, seem that the difference is related to territory, since the percentages of female donors in other Mediterranean countries, such as Spain and Portugal, differ considerably from that in Italy.

A gender difference in blood donation does not seem to have received much attention in the literature, probably in part because it seems to be a specifically Italian phenomenon, not occurring in other countries. Indeed, there are only a few published studies that have investigated this phenomenon¹⁶. It seems that there has been a tacit acceptance of the gap between the proportions of male and female blood donors whereas this discrepancy certainly deserves a more detailed analysis, on the one hand to obtain a precise picture of the phenomenon and, on the other hand and more importantly, to develop strategies and introduce the necessary interventions to close, or at least, reduce the gap.

Design and methods

Given this peculiar situation of a low percentage of women among Italian donors, we looked at whether any differences have been described in the literature and, if so, what these differences are. We, therefore, carried out a search of the literature related to blood donation and its promotion in order to determine the role of the gender of the donors and which areas are most sensitive to gender differences and, therefore, require greater attention in the clinical context of the management of donors, from their recruitment to coping with any adverse reactions.

Starting from an analysis of the data in the literature on gender prevalences among blood donors in different countries and analysing the causes of any differences, the idea was to provide a springboard for future discussion, with the hope that dialogue between the various figures working in the sector will contribute to the growth of a gender culture in the setting of voluntary blood donation.

This non-systematic review considered works published in the main international journals dedicated

to the subject of blood transfusion (Transfusion, Vox Sanguinis, Transfusion and Apheresis Science, Transfusion Medicine, Blood Transfusion) in the last 15 years (from 1994 to 2009). About 80 publications were evaluated. Some works were not specifically focused on gender differences and, therefore, only the data related to gender were extrapolated when possible. For greater clarity of presentation the analysis of the works was divided into several themes, discussed in detail below:

1. motivation to donate blood among the general population and among blood donors;
2. regularising blood donations and rate of return after the first donation;
3. adverse reactions and reasons for exclusion from donation;
4. strategies for reducing adverse reactions.

1. Motivation to donate blood

The first area of research concerned the reasons why members of the general population give blood in order to identify motivations that could be the focus of greater attention in recruitment campaigns. Studies in this area are usually conducted by self-administered questionnaires in large populations.

Altruism is the most frequently mentioned reason for giving blood¹⁷, although research has shown that other factors also seem to play important roles. In particular, the concept of benevolence has recently been proposed¹⁸ to emphasise that giving blood involves benefits not only for the recipient, but also for the donor and that these benefits influence donation behaviour.

Other studies investigated the reasons for and resistance to blood donation among young individuals more specifically, relating blood donation behaviour to the effects of information and recruitment campaigns. For example, Hupfer *et al.*¹⁹ used self-administered questionnaires in a sample of 456 Canadian students with a mean age of 20 years to evaluate possible reasons for and resistance to giving blood, the perception regarding blood stores, and the possible consequences of making donations. This study did not find a relation between gender and the propensity to have donated blood at least once in the past; more interestingly, the factorial structure of the study showed that besides altruism and social influence, already known to be the motives most often

reported by female donors²⁰, curiosity about giving blood was a motivation among women but not among men.

With regards to the consequences of giving blood, women were found to have a greater expectation of trauma (during and after the process), but, at the same time, a stronger belief about the humanitarian aspects of their gesture (the possibility of saving lives) and a lesser perception of donation as interfering with their free time (this more "self-centred" aspect being cited by men). The influence of family and friends was stronger among women, whereas the fear of falling short of the expectations of others predominated among men. The greater female sensitivity to altruistic aspects²¹ was also manifested by women's attention to the need for stores of blood for medicine, perceived as scarce and, therefore, urgent, as a reason for giving blood.

Among the reported reasons for not giving blood, the predominant one was fear of some aspects of the collection process, such as needles, blood, mistakes, feeling unwell, etc., and the results, in concordance with the literature^{20,22}, showed that these concerns were more prevalent among women.

Glynn *et al.*²⁰ found that the percentage of people prepared to donate blood because they believed it to be beneficial to their own health was twice as high in men as in women, confirming that self-centred aspects are prevalent among men. The greater altruism shown by female donors also emerged in studies comparing remunerated and non-remunerated donors, in which men were significantly more frequent among the former group²³; this finding suggests that campaigns promoting blood donation by focusing on some kind of compensation (through secondary advantages such as gadgets, medical check-ups, etc.) are more likely to be effective among men than among women²⁴, and that, conversely, women are more strongly influenced by the perception of a need (for example, through periodic recalls of donors).

Another study²⁵ investigated what socio-demographic factors determine the proportion of blood donors in different urban areas of the State of Victoria in Australia; the authors crossed the data from about 30,000 donors (age, gender, number of donations, area of residence determined by the postal code) with census data of the general population living in the same areas as the donors. It was found that age and gender significantly influenced the number of

donors in certain areas; in particular, in areas in which there was an increase in the presence of young men (between 20 and 29 years old) the proportion of donors decreased, while, in contrast, it increased where there was a similar increase of young women of the same age group; this suggests that young women are more likely to donate blood than their male peers. A similar difference in favour of women was found in the age group between 40 and 49 years old, while the opposite situation occurred in areas in which there was an increase of 10% in the presence of men between 60 and 69 years old.

In contrast, in a sample of 600 donors, other authors²⁶ did not find gender differences in the reasons for giving blood (with the exception of working in the health care service and military service, in which women and men were prevalent, respectively) or with regards to obstacles to starting to donate.

Alongside these quantitative studies, generally conducted through self-administered questionnaires, there is some qualitative research, based on focus groups and discourse analysis and, therefore, inevitably on numerically very limited samples, but providing more in-depth information^{27,28}. Although these data are not divided by gender, they nevertheless highlight some interesting aspects: in particular, it emerged that deferred donors (for example, because of low levels of haematocrit or haemoglobin) often erroneously consider this suspension as definitive and not temporary, or at least they perceive it as such. A second important aspect is related to the perception of the need for blood: in the light of the studies discussed above, this is a particularly sensitive theme among women, suggesting that it could be an aspect to develop in information campaigns.

In general, the data in the literature on the reasons why people give blood suggest that there are some differences in motives, with altruism and helping others being more important among women and more individualistic aspects and social pressure being of greater relevance among men.

2. Regularising blood donations and the rate of return after the first donation

A study in 2002²⁹ investigated socio-demographic, medical and attitudinal factors related to blood donation in a sample of 385 subjects contacted telephonically. The results confirmed and updated

those of some previous studies on the low rate of single, occasional donations (possible in the USA) and the low percentage of women and Afro-Americans who return to give blood again. Among the possible reasons for the gender difference, the authors reported the donors' concern about their own health with regards to anaemia (a particularly important factor for young women who are often temporarily deferred because of a mild anaemia, as emphasised in other studies)³⁰, a possible pregnancy, low body weight or a previous history of deferral for these same reasons³¹. The higher probability of repeat donations by men was also found in subsequent studies and in specific settings, such as the military³².

Another study³³ showed a gender difference in the time between donations, which appeared to be shorter between the first and second donations in women, whereas from the third donation onwards, the interval between one donation and another was shorter among men than among women; these findings must, however, be considered in the light of a greater frequency of donation among men (in particular in Italy where, unlike in many other countries, women of child-bearing age are only allowed to give whole blood twice a year). However, another more recent study³⁴, in a cohort of donors comprising equal numbers of men and women, found that the trend with regards to repeat donations was similar in the two genders.

On the other hand, other authors³⁵ found a relationship between the intention to make a repeat donation and the perceived satisfaction with the previous donations. Among the cohort of 884 subjects studied, women had a significantly higher perceived satisfaction than men and the authors explained this difference by the greater predisposition of women to help others. With regards to this aspect, it should, however, be noted that perceived satisfaction is inversely related to the waiting time during the donation process which is, therefore, a variable relevant to the return of donors³⁶.

It is interesting to note that the number of invitations to give blood sent to blood donors does not explain gender differences in the rate of repeat donations (lower among women); men give blood more frequently than women independently of the number of invitations to donate made through different means of communication³⁷.

In a study³⁸ in which some socio-demographic variables such as gender and race were investigated, it was found that male donors, more than female ones, tended to consider incentives (small presents or gadgets) as important in influencing their decision to give blood again; the same study also highlighted that there was a gender effect among new Hispanic and Black donors, with women being more represented (whereas the percentages of male and female Asian and Caucasian donors were similar). This gender difference did, however, disappear among stable donors. Similar results were found in a more recent study³⁹, suggesting that the gender variable should be further investigated in relation to the recent encouragement of donations from foreigners in Italy.

The gender of donors has also been found to be associated with various deterrents to blood donation. Indeed, women more frequently indicated medical reasons, ailments or difficult veins as important barriers to giving blood⁴⁰.

One study on gender differences between donors in Greece⁴¹ showed that there was a male prevalence among donors (66% among voluntary donors, 70% among relatives of patients) and that this difference was due, as shown in other reported studies, to the temporary ineligibility of female donors for medical reasons related predominantly to low levels of iron or low body weight⁴²⁻⁴⁴. It was suggested female donors should be monitored more carefully and that they should be encouraged to return following temporary deferrals, emphasising that the deferral is not a permanent rejection but a temporary situation. Iron supplementation may be administered to patients with low levels of iron⁴⁵⁻⁴⁸.

One field of research has been devoted to producing an explanatory model of donation behaviours. For this purpose, variants of the so-called "Theory of planned behaviour" have been developed, incorporating various, already recognised factors, such as subjective norms, adverse reactions, satisfaction, and self-efficacy, into a coherent model^{49,50}. An extension of this research⁵¹ tried to evaluate the role of donor gender as a moderator of the relations observed between the variables in the model, showing that perceived self-efficacy is particularly important for women.

A large American study on more than 12,000 donors evaluated the importance attributed by donors

to altruism, empathic concern and social responsibility as reasons for willingness to donate blood. No significant differences were found in altruism scores between active donors and lapsed donors²¹. It was suggested that giving blood is only one of various possible altruistic acts and that among the reasons that can lead to a donor to stop giving blood (e.g. lack of time, negative experiences during the donations, difficulty in reaching the blood donation centre) one is certainly that of having found another altruistic activity than gives greater satisfaction, as indicated by a previous study in which women who had tried giving blood did not become regular donors because they had not found the activity sufficiently gratifying⁵². It appears that women attribute greater importance to empathy as a central motivation for becoming regular blood donors and could, therefore, be more sensitive than men to appeals focused on helping other people^{53,54}.

3. Adverse reactions and deferrals

One area in which gender differences are particularly significant is that of adverse reactions and, more generally, temporary deferral or permanent suspension from donation. Adverse reactions are generally intended to mean vasovagal reactions in their spectrum of manifestations, which ranges from pins-and-needles of the arm to loss of consciousness. However, some authors also include other signs, such as brachial haematoma and tiredness, in the definition.

A recent Italian study⁵⁵ recorded a rather low rate of adverse reactions (1.2%) in comparison to previously published rates. Interestingly, it was the regular donors and not the new donors who more frequently had these reactions, although the authors did point out the small percentage of new donors in their sample population, which could have made this finding unreliable. A similar rate of adverse reactions was, however, reported in a study of a population of Greek blood donors, in whom the percentage of such reactions was 0.87%, although this referred to more serious vasovagal reactions with loss of consciousness, pallor, dizziness, and loss of sphincter control⁵⁶; furthermore, no gender differences emerged.

Data from a project set up to record adverse reactions (READ) in Italy were recently published⁵⁷ confirming the low frequency of such reactions (0.59%). Analysis of these data did not show

differences in adverse reactions between men and women, despite the fact that such differences have been repeatedly reported in the literature. One explanation for these discrepancies probably derives from the definition of adverse reactions, which in the Italian studies were strongly related to symptomatic/behavioural aspects and were, therefore, evaluated externally by staff at the blood donation centres. It is interesting to note that some authors⁵⁸ have found a discrepancy between the adverse reactions observed by medical/nursing staff and those reported by donors when questioned at an interview 3 weeks after the donation. The staff recorded between 60% and 98% fewer adverse reactions than those described by the donors, indicating that some subtle symptoms are present in donors, but not detected. The same study by Newman *et al.*⁵⁸ showed that while vasovagal reactions, nausea, arm pain, and haematoma occurred in 2-10% of donors, bruises were much more frequent, being reported by 23% of donors. There was a substantial difference between men and women, with the former reporting half the number of symptoms reported by women. However, there was a fair number of new donors among the women in this study, which could have influenced the data since these are the subjects who are most at risk of adverse reactions. Indeed the differences became less significant, to the point of disappearing, if only regular donors (i.e. those who had given blood previously) were considered; only tiredness remained significantly more frequent among the women.

A subsequent study⁵⁹ focused on adverse reactions in a sample of 7274 new 17-year old donors (the minimum age for giving blood in the USA) considering gender and weight as potentially discriminating factors. The data confirmed the prevalence of adverse reactions (defined in this study as reactions occurring during or immediately after the donation of whole blood and including dizziness, sweating, weakness and fainting) and showed that these reactions were more than two times more common among the females than among the males (16.7% versus 7.3%, respectively). This finding is consistent with that of a previous study⁶⁰, which also compared men and women in the same weight ranges, once again showing that women were significantly more likely to have adverse reactions. It is, however, interesting to note that when donors weighing less

than 150 lb (about 70 kg) were excluded from the analysis, the gender difference in adverse reactions decreased (5.7% versus 4.6%) suggesting that the effect of gender is mediated by weight and age.

Other studies have investigated the effects of giving blood on donors' perceived well-being or malaise; the data did not reveal significant differences between men and women with regards to positive effects such as physical and psychological well-being, pride and satisfaction, while mixed and negative effects (including dizziness and dullness) were more commonly perceived by the women, as widely discussed in the literature⁶¹⁻⁶³.

One aspect that seems to play an important role in adverse reactions and whether blood donors return to give blood again is the donors' perceived anxiety which is positively correlated with adverse events and interventions by medical or nursing staff for both male and female donors, but inversely correlated with the return of female donors (but not of male donors)⁶⁴. It, therefore, seems that although adverse reactions occur in both men and women, it is only women who are influenced negatively by them.

Few studies have investigated adverse reactions related to multicomponent donations. One study that did, which was conducted in Japan⁶⁵, showed that while there was not a marked difference in adverse reactions to giving whole blood between men and women, women had more reactions than men when making an apheresic donation (4.04% versus 1.24%). The incidence of adverse reactions was highest among women over 45 years old and increased with repeated cycles of apheresis. The prevalence of adverse reactions in subjects making multicomponent donations was also determined in the already mentioned Italian study⁵⁷; no gender differences were found in that study.

As regards suspensions from donation, differences have emerged in the profiles between men and women: men are more likely to be asked to defer giving blood or be suspended because of low blood pressure, while the main cause in women is a low haematocrit or low iron concentration^{66,44}.

In conclusion, generally speaking there is a higher incidence of adverse reactions among women, although gender alone does not explain the difference, which is mediated by other factors such as weight and age. Particular attention should be given to the

negative influence that adverse reactions have on whether donors return to give blood again.

4. Reduction of adverse reactions

Among the strategies studied to achieve a reduction in adverse reactions and, consequently, an increase in the rate of return of donors, four have gained particular attention: the assumption of fluids (water or coffee) about half an hour before the donation, muscle tension exercises, audiovisual material, and social support. Other strategies have been proposed recently and are supported by some preliminary efficacy data. For example, the use of lidocaine local anaesthesia has been suggested⁶⁸, but the applicability and costs of this approach render it inappropriate in the current situation of blood collection, and better suited to specific emergency situations.

Muscle tension exercises have been studied, in particular by some Canadian researchers^{69-71,64} who showed their efficacy in reducing adverse reactions and, in a follow-up, of increasing the rate of repeat donations in the 2 years following the intervention. This strategy was found to be particularly effective in reducing adverse reactions in women and in increasing the rate of return donors, which was higher among donors who performed the muscle tension exercises than in either donors who did not or donors who only used the ball that is generally given to donors to enhance blood flow.

Other authors⁷² determined the efficacy of printed material in strategies to cope with adverse reactions. A specifically designed brochure reduced anxiety in donors. Potential gender differences were not, however, discussed.

Drinking 300/500 mL of water before giving blood was also found to be effective in reducing adverse reactions^{73,74}, although another study⁷⁵ did not show differences between men and women.

In a more recent study, the same authors⁷⁶ focused on social support (talking with the donor, making reassuring remarks if the donor was anxious, etc.) as an efficient method to reduce adverse reactions; in this case, too, gender was not a differentiating factor.

Conclusions

The studies presented in this non-systematic review have shown how the gender of donors is a variable that, albeit to different degrees, plays a leading role

in all the areas investigated, from motivation to give blood, to sensitivity to adverse reactions. Furthermore, alongside some of the issues discussed so far, it is important to note gender-differentiated restrictions concerning the frequency of donation, which seem to be specific to Italy. In fact, in Italy men can give blood every 3 months (and, therefore, up to four times a year) but women can donate every 6 months (and, therefore, only twice a year, if of child-bearing age). In other European countries a higher frequency is allowed, varying between four and six donations per year for men and between three and four for women.

A reduction in the time between one donation and another, a variable that is central with regards to the donor return rate, could contribute to increasing the frequency of donations and increasing the presence of women among the population of Italian donors; this hypothesis obviously requires further analysis although some preliminary data from multicomponent donors (therefore, with a shorter time between two donations) would seem to confirm this hypothesis. This aspect highlights how the lack of shared practices concerning the selection and management of donors hampers European coordination of transfusion policies. On this background a Working Party represented by 18 European countries, not currently including Italy, was established in 2007 with the aim of drawing up common guidelines on the management of donors (the DOMAINE project)⁷⁷.

The factors identified in North America as penalising female donors⁷⁸ were essentially of a medical nature and have long been recognised. Targeting these factors, the authors proposed interventions to decrease the "haemorrhage" of female donors as much as possible (even though the loss of female donors is far less significant in the USA than in Italy). Three solutions were proposed: the use of apheresis for new donors at risk of adverse reactions, the use of apheresis for donors who are not able to give whole blood (it was found that proposing the alternative immediately helped to retain donors) and the use of some simple methods reported in the literature to reduce vasovagal reactions.

Another American study⁷⁹ focused more specifically on gender, showing that approximately half (49%) of all people who presented to give blood were women, but that this percentage differed according to age. Up to the third decade of life, women

accounted for over 50% of donors (reaching 58% in the age group between 21 and 30 years old); subsequently the percentage decreased, falling to 44%.

On the basis of published data, there are essentially two factors associated with a greater loss of female donors. The first is the higher rate of deferrals: women often present to give blood, but are not allowed to make a donation, most frequently because of a low level of haemoglobin. The second factor is the higher rate of adverse reactions in women, which is related to the lower weight of women compared to that of men, which increases the probability of adverse reactions such as dizziness and fainting.

In the light of all the above, it is important to start considering giving blood as a heterogeneous process which must be constructed around the donor, taking into account his or her socio-demographic variables. Recruitment campaigns should not be based simply on generic altruism and greater use should be made of strategies that have been documented to be effective in reducing adverse reactions and in improving the quality of the experience of giving blood, which is correlated with the probability of returning to make further donations. Studies on "tailored donation"⁸⁰⁻⁸² have underscored the importance of directing donors to different types of donation (whole blood or multicomponent) on the basis of their different haematological parameters, enabling a personalised donation to be developed: this could reduce the risk of iron deficiency and adverse reactions in the donor. This approach could be effective in closing the gender gap in Italian donors and its efficacy could be easily evaluated by determining whether the percentage of female donors increases in a setting in which tailored donation is applied correctly.

Given the paucity of women among Italian blood donors, it is important to start focusing on gender, although remembering that it is not gender itself that is the discriminatory variable, but that it mediates the effects of other variables shared by men and women. Starting from these considerations some working indications can be drafted for development into specific projects, verification of efficacy, and possible extension to all blood donation centres:

- recruitment campaigns based on published data concerning different motivational variables;
- local testing of easily used strategies such as giving the donors at risk of adverse reactions (e.g. those

with low weight or low blood pressure, first-time donors) a drink of water before the donation;

- showing videos or providing brochures that explain how to perform muscle tension exercises;
- facilitating contact between donors during the blood collection process as a way of distracting them, which can also be done by supportive staff;
- carefully monitoring of donors who are deferred, supporting them (particularly female donors) and checking that they understand the temporary nature of the suspension.

These proposals must be included within a broader promotional strategy, which should be constructed drawing on the indications published in the literature and developed through an organised communication plan which also incorporates new media (e.g. e-mail, sms).

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