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Review article

# Ethics in transfusion medicine: Are the intricate layers of ethics all universal? A global view

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Ethical principles have been considered, and in several respects regulated, along the entire blood procurement chain from donor motivation to transfusion to the patient. Consent of donors and voluntary non-remunerated donation are fields which have been addressed by codes of ethics and legislation. Caring for donor health is an area of further development of ethical standards. In part, blood products have also become a market, where commercial principles may synergize, but also creating issues in equality and maintaining human dignity that challenge societal solutions. At the bedside, the main global challenge remains to procure enough blood products for each patient in medical need. Allocation of rare blood, ethical evaluation of transfusion triggers, attitudes towards refusing blood transfusion and provision of blood products to remote settings are areas which should receive consideration.



**Contents**



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## 1. Introduction

Transfusion therapy continues to rely on products derived from the blood of human volunteers. Certain conditions, however, may compromise their availability [1]. The World Health Organization (WHO) has placed labile blood components (BCs) on its "Essential Medicines" list, alongside certain plasma-derived medicinal products (PDMPs) [2], meaning that transfusion should be universally available to anyone in need. This is yet not the case in certain parts of the world, where access to blood varies widely geographically. While quantitative needs are increasingly being satisfied, quality and adherence to recommended standards, such as leukoreduction and extended testing for transfusion-transmitted infections (TTIs) are still in progress in countries with developing economies [3,4]. Undoubtedly, a country's economic strength is crucial to securing contingency BC inventory. Additional budget may be necessary to strengthen blood transfusion safety [5]. While citizens of low-income countries may seldom be in the position of giving consent to receive a life-saving transfusion because blood may be lacking, citizens from high-income countries may self-deny access to blood for personal reasons, even at the risk of not surviving this decision. This is not the least of the paradoxes associated with transfusion [6].

Blood donors' consent to give access to living cells and plasma is central. Reciprocally, BC recipients consent to exposure to foreign cells and proteins presenting variable elements. Every one of the multiple steps of the transfusion process is subject to ethical discussion. Since 1975, WHO has mandated that all transfusions originate from blood given voluntarily, anonymously, and freely without payment, reward, or compensation, other than occasional reimbursement of travel expenses [7]. European Union (EU) Directive 2002/98 EC confirmed this principle [8]. "Voluntary Non-Remunerated Blood Donation" (VNRD) is however not yet the predominant donation mode worldwide, an issue that questions almost half a century of effort. The reason for this delay in achieving the WHO's objectives is probably multifactorial. Furthermore, between VNRD and the for-profit collection of BCs, there is a "grey zone" as (i) certain blood banks (BB) in countries that operate with VNRD can make some profit by charging hospitals, and (ii) states often receive value added tax upon transfers on a commercial basis to health care facilities.

## 2. Ethical aspects of blood donor recruitment and retention, and blood donation

### 2.1. What the history of blood transfusion tells us

Transfusion therapy arose after more than a century of struggle to compensate for loss of blood, correct anemia and compensate for reduced oxygen delivery and cardiac output. The subsequent discovery of major blood groups and invention of anticoagulant and buffers created conditions where blood could be transported and then preserved for a few days, enabling distance between donors and recipients, and ending the arm-to-arm obligation [9]. After the discovery of blood group compatibility, transfusion tended to become unlimited in patients; only later were more conservative regimens applied, consequently reshaping global demand for blood with a very different message sent to patient populations [10].

Major technical progress was made regarding: (i) collection and preservation devices; (ii) tools to secure blood and halt transmission of infectious pathogens; and (iii) processes to separate specific components and fractions to best fit the patients' needs. However, although medical indications have changed significantly, the essence of blood transfusion is very close to what it was a hundred years ago: (i) the willingness of healthy, humanitarian, compassionate persons to offer blood that they know is essential to counter life-threatening conditions; (ii) the intervention of professionals who receive donated blood and allocate it to recipients, according to a risk/benefit evaluation, whenever blood is available [11].

Transfusion passed through one major crisis, when blood transmitted lethal infections (the tainted blood scandal). This shook confidence in blood safety, reduced the number of donations and changed the profile of transfusion medicine. A timeline of transfusion landmarks can be obtained from several references, covering the periods both before and after that scandal [9–12].

### 2.2. Voluntary non-remunerated blood donation and beyond

Blood establishments (BEs) and NGOs oversee the collection of whole blood and separated BCs in most countries, while some local institutions such as hospitals may also run collection programs for their internal use. Of the various ways of accessing blood: (i) mandatory donation is exceptional; (ii) paid collections are no longer the most common when it comes to cell donations (unlike plasma); (iii) directed donations for medical reasons are rare; (iv) family/replacement donation is still frequent in low- to medium-income countries where relatives of patients are invited to donate or recruit donors in order to replenish the BB for BCs issued for their family member (it is made clear that the donated blood is not intended for allocation to this particular person); (v) VNRD is the other common type of donation. Of note, several experts have argued in favour of a donation type that fits certain needs e.g., in Africa, based upon some type of contract of safe behaviour [13,14]; this has been largely opposed as unethical but is mentioned here to suggest that it is possible to explore other creative modalities.

WHO's view has consistently favored 100% VNRD, denying some benefits for replacement donation. In theory, either of the two types should be managed in different settings. However, many

countries operate both to meet demand. Exclusive VNRD commonly characterizes systems where national or large organizations are in place, whereas replacement donation is operated by smaller and less well-resourced entities.

VNRD is endorsed by most major European and World organizations. The EU is promoting a revised plan to promote VNRD and to regulate the use of substances of human origin [15]. Though VNRD is the modality that is deemed safest, one may still ask if it is always entirely "voluntary". There are numerous examples of social pressure—albeit well-intended—towards donation in mobile drives especially in small towns, enterprises, and schools and universities where it may be difficult to not be a donor candidate and thus appear to lack solidarity with a good cause. When a BE calls urgently for donation because of acute shortage, and sends repeated telephone calls, e-mails, or texts, may "voluntariness" not be influenced? [16].

In discussing blood donation, the notion of fairness in access to blood donation as a principle of equity between citizens must also be taken into consideration. Equity is barely achievable in transfusion systems where there is no public/national service. Nor is equity achieved when mobile drives do not — or no longer — serve all places in each country, for economic and/or logistical reasons. In some remote territories, blood donation has been never established or was discontinued (because of the once acknowledged—but never revised—burden of TTIs) even though a fair proportion of the population displays e.g., hemoglobinopathy and requires transfusion programs. These examples illustrate gaps between blood donation and universality, and question "A right to donate" [17]. Most professionals and associations agree that there is no such right, but that blood donation is a privilege of the healthy as opposed to sick persons. A privilege that cannot, however, be exercised universally.

## 3. The globalization of blood transfusion

### 3.1. The marketing of blood donation

In most countries, blood donation fails to meet demand without additional advertising. In response, in high-income countries, BEs have set up departments which apply the vocabulary and tools that are employed to sell goods in commercial marketing. Blood, however, is not a good to sell in a VNRD system. This situation generates paradoxical gaps between some professionals and the benevolent donor world, turning into a downward spiral especially when BEs are forced into making urgent calls or frequent expensive advertising to attract donor candidates to collection sites. After nearly two decades of marketing of blood donation, it would be fair on the part of blood services to question their donor recruitment modes [18]. The much-discussed general question of blood's status as a commodity, or a public or social good, should be revisited considering current social concepts of solidarity. An adequate blood supply could be regarded as a "merit good", that is, a commodity which it is judged that an individual or society should have on the basis of some concept of benefit, rather than ability and willingness to pay.

### 3.2. Merchandizing

A globalized market for plasma derivatives, notably injectable immunoglobulins, emerged some decades ago, growing extremely fast [19]. It has been described as a cannibal market based on commodification of human derived substances [20]. This demonstrates how marketing can operate when blood is no longer donated but sold [21]. Plasma, selling outside the VNRD concept, has become a genuine good and there is no shortage of supply yet. For-profit entities operate within an industrial system that has sought to dampen the risk of supply shortage and to smooth production. This was seen in the opening of new markets in convalescent plasma during the SARS-CoV-2/Covid-19 crisis, when the industry adapted swiftly to the situation and advertised for more donations or paid more for donation [22]. One of the arguments of non-profit organizations opposing this open market in source plasma is that it is at odds with ethical blood donation's inviolable requirement to protect donors' health [23,24]. It can indeed be pointed out that excessive blood collection with no other reason than profitability, or without appropriate donor medical follow-up when donations are very frequent [25], creates the circumstances for non-ethical access to blood. Blood donation modes that do not involve intermediary profit should be discussed, perhaps in line with the incentive scaling proposed by the Nuffield Council on Bioethics [26].

## 4. Codifying the ethical aspects of transfusion

Laws that define blood and blood components in some countries tend not to say what blood is but what it is not, for example, a commodity. A legal framework setting out responsibilities and liabilities was forced on blood transfusion by the tainted blood scandal of the 80′s and 90′s. It is indeed a moral duty not to expose a BC recipient to pathogenic infectious agents that can now be prevented by robust quality and safety measures all along the blood supply chain up to the bedside. The legal status of blood as a body part (e.g., the issue of owning one's blood, or its status as a public good) had to be formalized. The "Convention for the Protection of Human Rights and Fundamental Freedoms" (1950–1953) was the first instrument to give effect to certain rights stated in the "Universal Declaration of Human Rights" and make them binding. Europe later adopted an extension of this Declaration, the "Convention for the Protection of Human Rights and Dignity of the Human Being with regard to the Application of Biology and Medicine: Convention on Human Rights and Biomedicine" (the Oviedo Convention), which opened for signature in 1997. This is the only international legally binding instrument on the protection of human rights in the biomedical field. It is a framework convention aiming to protect the dignity and identity of all human beings, and to guarantee everyone, without discrimination, respect for their integrity and other rights and fundamental freedoms regarding the application of biology and medicine. It sets out fundamental principles applicable to daily medical practice and is regarded as the European treaty on patients' rights. Within the EU, blood and labile BCs are regulated by Directive 2002/98/CE (and four more documents providing specifications); blood is confirmed not to be a tradable commodity. In contrast, Directive 2001/83/CE stipulates that source plasma and PDMPs are exchangeable between markets and are tradable [27]. EU countries have passed decrees to transpose the Directives relating to labile BCs and PDMPs. Consequences have been described in the preceding paragraph about merchandizing, with possible attaints to human integrity, and likely attaints to human dignity.

First drafted in 1981, then refined in 2006 and 2017, the ISBT's "Code of Ethics" covers blood donation and blood transfusion [28]. Even though it uses 'should' instead of 'must'—and despite its good intentions—the Code is not consensual; disputes arose about source plasma and the position of for-profit organizations which argue that only a robust industrial model can ensure the uninterrupted production of safe inventories of PDMPs, both in terms of quantity and quality [29–34]. A subsidiary point of contest concerned blood as a public (universal) resource (like water, air, wildlife etc.) [35].

As seen, neither official statements nor ethical codes prevent the commodification of blood when it comes to plasma as a raw

material. Unlike blood cells, plasma is not considered a body part, as it can be bought and sold to make profit. In contrast to luxury goods, however, PDMPs are vital to patients in need, and somebody must prepare medicines. It is therefore crucial that states ensure that no shortage of PDMPs, for whatever reason, threatens the survival of thousands of persons who depend on those products [20]. This most likely requires some form of state intervention in favor of VNRD in the context of an industry evolving on a liberal model, or nationalization of the production and supply of PDMPs.

## 5. Ethical aspects of blood donation and collection: Medicalizing the good intention

Dedicated "Donor healthcare" emerged recently but is now firmly established. It is principally based upon donor hemovigilance. It raises several ethical concerns, dealing with both the pre-donation and post-donation periods [36].

The pre-donation assessment is unique in healthcare, since BE personnel have authority to decide whether the donor candidate is in good or bad health. This is a quite remarkable statement to be made by a nurse or blood technician. It differs radically from a consultation at the doctor's office where an initial tentative evaluation may be checked by thorough physical examination and subsequent laboratory tests. However, the pre-donation interviewer's decree of 'not today', 'not for 4, or 6, or 12 months', or 'never again' is absolute. No appeal is allowed, which makes the situation even tougher in theory than a court of law's imposition of a penalty. Furthermore, acceptance versus deferral of blood donor candidates may correspond to 'normality' or 'abnormality' of the person in the eyes of the community; this is a danger in small donor communities [37].

The shift from a "recipient first" to a "donor first" safety policy is in line with most deontological practices and the code of ethics. Blood transfusion stakeholders, and legislators, have robustly pursued the prevention of TTIs [38]. Recently, most countries have revised the policy of banning male donors who have had sex with other men. Many countries are considering abandoning the ban of plasma collected in countries that faced cases of vCJD. However, problems remain as, for example, when inventory is dramatically low, as it may compromise the donor's autonomy to decide in full knowledge of the risks e.g., of becoming iron deficient. Of note, it is commonly accepted that derogations can be made for directed donations and rare blood groups.

Two main risks in donating blood are clearly identified: one is imbalance in the cardiocirculatory flow and the risk of allowing the decompensation of preexisting cardiocirculatory disease, and the other is exposure to iron deficiency and anemia. Pre-donation testing of hemoglobin disqualifies a significant number of blood donor candidates. The hemoglobin threshold adequate for safe donation has long been in dispute regarding donor candidates of African ancestry who present lower physiological hemoglobin levels than Caucasian-type donors. The post-donation risk of donor iron deficiency raises the question of prevention, an area which would trespass on family medicine practice, or non-prevention which incurs a risk of leaving iron-deficient persons untreated [39].

A further ethical concern in blood donation is the appropriate information to provide to donors who present with serious conditions such as HIV, HCV, and HBV infections. Certain infectious diseases must be notified to national registers and either referral or counseling must be provided, to protect that person as well as sexual partners or persons living in the same household; information is provided in accordance with deontological codes and good medical practice. The acceptance of candidate blood donors with a theoretical risk of carrying infections despite thorough testing is unresolved on ethical grounds; the return to blood donation of males who have had sex with other men represents the first breach of the zero-risk "rule" even at the expense of the precautionary principle [40]. A truly zero-risk policy is however unachievable and actual nosocomial risks are far greater than those theoretically induced by transfusion. This theoretical risk could be balanced against that of blood shortage.

Genetic traits such as minor hemoglobinopathy present an ethically interesting case, as there should be a balance between: (i) the necessity of collecting blood from populations closest to those in need, with matched blood group genotypes and phenotypes; (ii) the good manufacturing requirement to leukofilter blood within a fixed time frame (not possible in the case of hemoglobinopathy leading to slow filtration); (iii) the imperative to protect donors from iron depletion, to which the donor candidate with minor hemoglobinopathy is already exposed [41].

The medicalization of blood cell donation has paralleled donor hemovigilance [42]. It is not fulfilled regarding plasma collection within the for-profit sector, pointing to potential donor risks. The case of plasma protein exhaustion in occasional malnourished frequent donors in plasma centers theoretically leads to a lower yield of proteins of interest, imposing further collections to meet the requirement, once again leading to a downward spiral. This issue is disputed by plasma collectors; scientific data is awaited from a dedicated trial [43].

## 6. Are there ethical concerns relating to blood components?

Ethical concerns are rarely addressed when it comes to the processing/manufacturing of BCs to ensure an inventory that meets all needs, avoiding the imposition of restrictions that might increase the risk of shortage. Unquestionably a responsibility falls on BEs and, above them, the medical authorities overseeing public services to allocate the necessary resources to optimize platforms, computing, surveillance, controls, and vigilance. It also falls within the authority's responsibility to ensure that BCs are qualitatively safe, meaning that procedures for quality control of BCs must be defined and supervised or controlled, and that the most relevant TTI pathogens are tested for or inactivated [44].

The issue of the quality of BCs acquires renewed interest at a time when options may come into conflict. While fresher BCs generally lead to a more favorable recipient outcome, older BCs are not discarded before outdating, because blood is too scarce. However, freshness is not clearly defined, and clinical trials do not address clearcut questions to solve this qualitative issue [45]. The implementation of pathogen reduction technologies for platelet components and therapeutic plasma proved extreme efficacy on the initial target of TTI prevention. It may however induce some alteration of the BC and involve additional costs [46]. What is, thus, best for the patient [47]?

Authorities redistribute public money, obtained from taxes on citizens, enterprises, and industries, according to politics; in democracies, citizens influence politics and, hence, public health priorities. Governments must uphold or correct previous decisions and decide whether to give transfusion high priority, considering that transfusion cannot be for free. There are the direct costs of each step of the process from donor to bedside, and indirect costs that include follow-up (epidemiological surveillance and hemovigilance) and compensation for accidents (e.g., to victims of the tainted blood scandal). Transfusion costs have further to be weighed against alternatives to transfusion, the establishment of measures to prevent diseases that will require transfusions as they progress, and the education of patients and professionals to achieve this goal.

The quality of blood also covers immunologic compatibility, which authorities regulate directly or indirectly by allocating suffi-

cient resources for optimal typing and screening of blood from both donors and recipients, possibly using genetic markers, and by targeting alternate populations of donors from more genetically diversified populations.

Of particular concern is the possibility that sensitive information can be accessed from a donor database (sex, medications, hygiene, supplementary diets, alcohol, tobacco, recreational substances, stimulants, etc.) [48]. This underlines the need for consolidated processing and securing of donor personal data, and discussion with representatives of donor populations who fear that sensitive information is accessible in cloud storage, thus vulnerable to malice and fraud [49]. In this context, a new set of ethical questions arises concerning the genotyping of donors and metabolomic studies on components and storage by-products, to address the issue of blood elements that may be undesirable in the final component.

## 7. Ethical aspects of blood transfusion at the bedside

### 7.1. Infor***med consent

The cornerstone of transfusion is informed consent, given by donors who must receive state-of-the art, honest information regarding the risks of donating, and by recipients who must be presented with balanced benefits and complications of a single episode or repeated episodes of transfusion [50]. The informed consent principle derives from legislation regarding patients' rights, adopted in most countries nearly two decades ago. Although this principle goes without saying in Anglo-Saxon and Nordic countries, its recognition was much less straightforward in Latin countries. Strict application of this seminal concept is however subject to limitations, as with underage, comatose or unconscious, demented, illiterate, and severely deaf and blind patients. Informed consent is intended to be provided orally to make sure that it is heard and understood and that questions can be asked without fear or hesitation and answered fairly. Some limitations remain shadowy regarding the object of the consent: e.g., do patients have to consent to nosocomial risks caused by blood [51]? BCs receive meticulous attention during the processing and testing phases but, alongside the desired therapeutic compounds, still contain remnants of cellular and soluble by-products (and untestable infectious agents) [52]. Authorized BCs meet criteria based upon clinical trials that were designed to evaluate the desired components, irrespective of the occasional complications that may arise from the interaction of component and patient. Red blood cell (RBC) components are good for issue up to 42 days (at present, in most blood services, though extension to 56 days is underway using novel storage solutions) but blood older than 15–21 days may not suit extravascular circulation, nor RBC exchange in hemoglobinopathy, etc. [53], though progress is being made [54]. Who would agree to receive transfusion if presented with all the complications possibly due to transfusion considering the unknowns of their genetics?

### 7.2. Ethical and legal aspects at the bedside

Legal aspects of blood and blood transfusion have been analyzed exhaustively since the tainted blood scandals [55]. Transfusion is perhaps the medical domain where most situations have been anticipated and regulated, leading to the early construction of quality systems. Quality systems inevitably equate to safety issues, allowing the emergence of normativity, liability and – as has been seen after the tainted blood scandal – the pursuit of legal responsibility or blame. It has been made clear that liability falls on the BE and under no circumstances on the blood donor. That, however, questions the issue of donors' autonomy and moral if not legal responsibility.

### 7.3. The refusal of blood transfusion

To refuse blood transfusion is a patient's fundamental right. Much has been written on this specific question, with a focus on the refusal of Jehovah's Witnesses to countenance transfusion on religious grounds [56,57]. The issue becomes critical when parents oppose transfusion for their sick child for religious reasons or oppose transfusion for a sick aged parent no longer capable of expressing their consent to that treatment option.

This ethical question also arises from the opposing views of healthcare providers trying to convince anemic patients to receive transfusion, and recipients who are tired of suffering from transfusion discomfort with little if any improvement in their condition, as seen in myelodysplastic syndromes of long duration [58]. Conflict may also arise since transfusion may be denied to persons of great age or in palliative care on the grounds that the risk–benefit balance is unfavorable, and that blood is a rare resource. Is it the role of physicians to decide who will and will not benefit from transfusion in case of supply shortage [59], or to operate triage [60]? Is it not authorities' role to anticipate the possibility of unexpected major demands on the blood supply?

Internationally active specialists often observe the heartbreaking discrepancy between high-income countries where transfusion can be refused [61], and low-income countries where only the most urgent transfusion can be given because of the almost permanent shortage of BC while many anemic patients die without transfusion resources [62].

### 7.4. What has "Patient Blood Management" changed in the field of blood transfusion ethics?

From its initial three pillars [63], Patient Blood Management (PBM) has extended to minimizing the need for blood transfusion—particularly of RBCs—in non-surgical situations such as the treatment of hemoglobinopathy. In focusing on the patient, PBM is profoundly ethical in its aim to optimize the patient's condition while minimizing transfusion-induced complications. However, concerns have arisen over the risk of under-transfusion, and possible complications of non-transfusion or alternatives to transfusion such as injectable iron, growth factors, etc. [64]. Concerns also arose over intense lobbying in favor of PBM and zero-transfusion programs, sustained by drug manufacturers and Jehovah's Witnesses. Lobbying does not necessarily conflict with good intent; however, it demands caution and responsibility.

### 7.5. Rare blood allocation

Rare blood allocation refers to two different situations: when a rare blood group blood is needed and when blood is a scarce resource. It concerns not only rare RBC groups but also platelets, in the situation where donors with specific HLA or HPA antigens are urged to donate for a patient presenting with multiple antibodies.

Increased frequency of rare RBC blood group recipients in a healthcare system is a consequence of population migration. Some phenotypes once considered rare in Europe are in fact frequent elsewhere; increasing numbers of recipients of African ancestry are now receiving care for conditions such as Sickle Cell Disease (SCD) in Europe and North America. But as most blood donors in Europe are of European ancestry, there is often a gap between the resource and the need to avoid creating immunizing situations that may be severe in SCD patients. To circumvent this, specific campaigns are addressed to target populations that share what

has been improperly termed "phenotypes of interest". While such campaigns are necessary and acknowledged as such by representatives of the relevant communities, they may conflict with the universality principle of blood donation, despite being designed with the best intentions [65]. Rarer blood groups are consequences of mutations found in small groups or families (either by the emergence of private antigens or a lack of public antigens): special rare blood group programs have been set up by a small number of banks, that sometimes operate internationally. Donations are begged from healthy carriers of such groups — violating the principle of voluntariness — either to stock the rare blood bank for anonymous recipients or for autologous use in case of necessity.

Another situation, still under vigorous debate, is the transfusion of granulocytes, although this is rarely needed and has even been discontinued in certain countries [66,67]. Collection of granulocytes by apheresis may expose donors to complications because of the injection of corticosteroids and growth and stimulating factors, which clearly opposes the "first do no harm" principle.

### *7.6. Distributive justice and allocation of blood in remote settings*

Within the same country, BCs may be available in general but scarce in specific settings. In non-centralized systems, a hospital BB may run short of blood after issuing large amounts for one patient. In such countries, each hospital's BB is responsible for its inventory and must negotiate BC transfer from partner hospital BBs, if any. In countries with a centralized healthcare system, there may be a complex network of hospitals providing emergency rooms, operating theatres, delivery facilities, etc. The BB may be restricted to an emergency inventory, and the hospital is vulnerable to running short quickly. Furthermore, these emergency banks rarely maintain platelet component inventory because of the very short period of outdating and for reasons of logistics and economy. This clearly opposes the principle of justice when equal chances of being transfused according to state-of-art recommendations may be denied. Shipping ad hoc BCs from larger facilities may take time, often imposing the transfer of the patient to a larger referral hospital, which represents a burden on the family and society [68].

## 8. Transfusion in resource-scarce countries and concluding remarks

Running a blood service in a resource-scarce country encounters all the ethical concerns that have been discussed herein. Building an inventory that can serve emergency situations may require recruitment of donors who may not be voluntary and face risks in donating, and possibly expose recipients to infectious pathogens [69]. Areas where hemoglobinopathy is common need BCs in large amounts to treat patients and require blood donors free of the genetic deficiency trait. Imported blood exposes recipients to immunological complications as populations are group mismatched, favoring alloimmunization [42]. To a greater degree than in countries with sustainable blood services, it is necessary to prioritize. The risks and benefit of not being transfused must be evaluated much more frequently than those of being transfused. Furthermore, besides being responsible for building a safe and qualitative BC inventory, blood services must oversee processes that are not under their responsibility, such as the ad hoc provision of transfusion devices bought in local pharmacies. A recent report from India drew attention to the fact that not all such devices meet safety standards [70]. International assistance regarding transfusion services is limited despite sustained efforts from some wealthier countries in Europe and the Americas, principally because blood must be collected at close hand, within the local populations, and because recipients' needs differ from the needs in countries in which most international experts were raised and educated, not to mention differing attitudes towards blood.

Transfusion of donated blood is sometimes the only way to survive a serious condition. Individuals, organizations, associations, and academics should collectively take on responsibility, the latter through the development of reflection in human sciences and ethics. Special attention should be given to international collaboration as the gap between blood services in high- and low-income countries is in fact increasing. Although there have been substantial achievements regarding ethical concerns in the domain of transfusion, there are still obstacles ahead which must be overcome, not least the move towards a consensus on VNRD.

## Disclosures

OG is a member of the Scientific Advisory Board of Macopharma, Mouveaux, France. None of the coauthors disclose conflicts of interest.

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