

BLOOD DONATION IN DONORS WITH ARTERIAL HYPERTENSION: CURRENT ELIGIBILITY CRITERIA AND CHALLENGES

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Abstract: Blood donation occupies a central place in modern transfusion medicine and is essential for ensuring timely and safe transfusion therapy. The effective functioning of transfusion systems depends directly on maintaining a stable pool of voluntary and regular blood donors, which requires optimization of donor selection while strictly adhering to medical and ethical principles for protecting donor health.

Over recent decades, chronic non-communicable diseases have tended to occur at younger ages worldwide, changing the health profile of potential donors and creating new challenges for transfusion medicine. Conditions traditionally associated with older age are increasingly being seen in younger people, resulting in a growing proportion of individuals with chronic conditions who are willing to participate in blood donation programs. In this context, arterial hypertension has become one of the most common chronic conditions and affects a substantial proportion of working-age adults, including potential blood donors. Its increasing prevalence poses challenges for transfusion practice, particularly with regard to reconsidering traditional eligibility criteria, individual risk assessment, and ensuring donor safety during and after donation.

Historically, arterial hypertension was often regarded as a relative or absolute contraindication to blood donation because of concerns about adverse hemodynamic reactions. Current scientific evidence and international guidelines support a more differentiated approach in which the degree of blood pressure control, the stability of antihypertensive therapy, and the absence of clinically significant complications are the key considerations. Accordingly, the presence of arterial hypertension alone is increasingly recognized as not constituting an automatic contraindication to blood donation.

1. INTRODUCTION

Arterial hypertension is one of the most prevalent chronic diseases among working-age adults and is a leading modifiable risk factor for cardiovascular morbidity and mortality. Its increasing prevalence, including among potential blood donors, challenges transfusion medicine to reconcile donor safety with the need to maintain a sustainable donor pool. In this context, European recommendations for the management of arterial hypertension are highly relevant to the development of contemporary donor selection criteria.

2. AIM

This review aims to systematize and analyze current scientific publications, recommendations, and good practices related to blood donation in individuals with arterial hypertension, with emphasis on donor selection criteria, potential risks, the significance of antihypertensive therapy, and the role of healthcare professionals in assessing, monitoring, and ensuring donor safety.

3. METHODOLOGY

This publication is a narrative literature review intended to summarize and analyze current scientific evidence on blood donation in donors with arterial hypertension. Medical and organizational aspects of donor selection were examined, with a particular focus on donor safety.

The literature search was conducted in PubMed/MEDLINE, Scopus, and Web of Science, as well as in official guidelines and recommendations issued by international and national health and transfusion organizations. The keywords blood donation, arterial hypertension, donor eligibility, and donor safety were used in combination with the Boolean operators AND and OR.

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Peer-reviewed scientific publications and relevant regulatory documents addressing eligibility criteria for donors with arterial hypertension, physiological responses, and risks associated with blood donation were included. The data were analyzed and synthesized thematically in the context of contemporary transfusion practice.

3.1. Arterial hypertension: definition, classification, and clinical context

According to the 2018 recommendations of the European Society of Cardiology (ESC) and the European Society of Hypertension (ESH), arterial hypertension is a chronic condition characterized by a persistent elevation in arterial blood pressure that exceeds the physiological regulatory capacity of the cardiovascular system and is associated with an increased risk of cardiovascular, cerebrovascular, and renal complications (Williams et al., 2018). In clinical practice, it is defined as office blood pressure with systolic values ≥ 140 mmHg and/or diastolic values ≥ 90 mmHg, confirmed by repeated measurements performed under standardized conditions (Williams et al., 2018).

According to the updated 2024 European classification of blood pressure, values in adults are divided into the following categories:

- Normal blood pressure – systolic < 120 mmHg and diastolic < 70 mmHg;
- Elevated blood pressure – systolic $120\text{--}139$ mmHg and/or diastolic $70\text{--}89$ mmHg;
- **Arterial hypertension – systolic ≥ 140 mmHg and/or diastolic ≥ 90 mmHg** (McEvoy et al., 2024).

Within arterial hypertension, degrees of severity are also distinguished, which are relevant both to clinical management and to assessing eligibility for blood donation:

- Grade I – $140\text{--}159 / 90\text{--}99$ mmHg;
- Grade II – $160\text{--}179 / 100\text{--}109$ mmHg;
- Grade III – ≥ 180 mmHg / ≥ 110 mmHg.

In transfusion medicine, it is essential to distinguish clearly between the diagnostic classification of arterial hypertension and the assessment of the donor's current hemodynamic stability required for safe blood donation. Blood pressure values therefore need to be interpreted in relation to the donor's overall condition, the degree of hypertension control, the stability of antihypertensive therapy, and the absence of clinically significant complications (World Health Organization, 2012).

3.2. Antihypertensive therapy and its relevance to donor safety

According to current ESC clinical recommendations, antihypertensive therapy is based on several major drug classes, used either alone or in combination to achieve sustained blood pressure control and reduce cardiovascular risk. The principal therapeutic classes include angiotensin-converting enzyme inhibitors and angiotensin receptor blockers, calcium channel blockers, diuretics, and beta-adrenergic blockers for selected clinical indications. In resistant hypertension and specific clinical situations, other drug classes may also be used, including mineralocorticoid receptor antagonists and centrally acting agents.

Contemporary treatment increasingly relies on combination therapy, which allows lower doses to be used, improves tolerability, and provides more effective blood pressure control. In transfusion practice, knowledge of antihypertensive therapy is important because treatment may influence hemodynamic stability and the risk of adverse reactions during blood donation. Careful assessment of the therapeutic regimen and its stability supports accurate evaluation of donor eligibility and effective preventive monitoring.

3.3. European guidelines from 2018 and 2024: aspects relevant to donor selection

The 2024 European guidelines on arterial hypertension reflect an evolution in the assessment and management of elevated blood pressure compared with the 2018 ESC/ESH guidelines, placing greater emphasis on early intervention and prevention of cardiovascular risk. The diagnostic threshold for arterial hypertension remains $\geq 140/90$ mmHg, while an expanded classification introduces the category of "elevated blood pressure" ($120\text{--}139/70\text{--}89$ mmHg), which is considered clinically relevant because of its association with increased cardiovascular risk (McEvoy et al., 2024; Williams et al., 2018).

A substantial change is also evident in therapeutic targets. Whereas the 2018 guidelines recommended a stepwise reduction in blood pressure, initially targeting $< 140/90$ mmHg with further reduction if treatment was well tolerated, the 2024 guidelines define lower target values, with a preferred systolic blood pressure target of $120\text{--}129$ mmHg for most patients. This approach is supported by evidence of a greater reduction in cardiovascular morbidity and mortality with more intensive blood pressure control, provided that treatment is individualized and well tolerated.

The 2024 guidelines also strengthen the role of out-of-office blood pressure measurement, recommending 24-hour ambulatory and home monitoring as standard approaches for confirming the diagnosis, refining risk stratification, and reducing the influence of phenomena such as white-coat hypertension. Pharmacological management has likewise shifted from a conservative model based on

initial monotherapy toward earlier use of dual combination therapy to achieve and maintain target values more rapidly.

Despite the potential clinical benefits, applying stricter target values may result in a smaller proportion of patients being classified as adequately controlled in real-world populations. This highlights the need to optimize treatment strategies, improve adherence, and actively involve healthcare professionals in long-term follow-up. In blood donation practice, this context is important because the assessment of blood pressure control influences eligibility decisions and the frequency of donor deferrals.

3.4. Eligibility criteria for blood donors with arterial hypertension – literature synthesis

Current transfusion guidelines and scientific publications consistently treat arterial hypertension as a condition in which eligibility for blood donation is determined by current blood pressure values, the degree of disease control, the stability of antihypertensive therapy, and the absence of clinical complications, rather than by the diagnosis itself (AABB, America's Blood Centers, & American Red Cross, 2022; Eder et al., 2009; Newman, 2013b; World Health Organization, 2012).

In the United States, the selection of donors with arterial hypertension is regulated through clearly defined numerical thresholds. Under federal regulations, donors should have a systolic blood pressure between 90 and 180 mmHg and a diastolic blood pressure of no more than 100 mmHg on the day of donation. Values outside these limits may be accepted only after an individual medical assessment and documented determination that donation is safe (U.S. Food and Drug Administration, 2026). Practical guidance from the American Red Cross is consistent with this regulatory model and explicitly states that well-controlled hypertension and the use of antihypertensive medication do not constitute contraindications, whereas a measured blood pressure above 180/100 mmHg results in temporary deferral.

In contrast to this threshold-based model, the United Kingdom and Ireland use a more clinically oriented approach in which publicly fixed numerical blood pressure limits are not the primary criterion. The Donor Selection Guidelines of the Joint United Kingdom Blood Transfusion and Tissue Transplantation Services state that donors with arterial hypertension should not donate in the presence of symptoms such as dizziness or syncope, heart failure, significant renal impairment, or when antihypertensive treatment has been changed within the previous four weeks (Joint United Kingdom Blood Transfusion and Tissue Transplantation Services Professional Advisory Committee, 2022).

Similar criteria are applied by the Irish Blood Transfusion Service, where blood donation is acceptable when blood pressure is well controlled, orthostatic hypotension is absent, and therapy is stable without recent adjustments (Irish Blood Transfusion Service, 2023).

A similar clinically based approach is found in the New Zealand Blood Service guidelines, where hypertension and antihypertensive treatment are considered compatible with blood donation when control is adequate and symptoms are absent. Additional restrictions apply to donors taking beta-blockers, including a minimum period of stable therapy and an adequate heart rate, to reduce the risk of adverse hemodynamic reactions (New Zealand Blood Service, 2021).

Canadian Blood Services provides an organizational example of a more liberalized, risk-adapted model. In this system, routine blood pressure measurement is not performed at every subsequent donation, and in first-time donors isolated values outside predefined ranges do not automatically result in deferral (Canadian Blood Services, 2022). This approach is supported by empirical studies showing that automatically deferring donors solely because of transient deviations in blood pressure does not significantly reduce adverse reactions but can substantially reduce the available donor pool (Clement et al., 2021; Goldman et al., 2013).

European practices for accepting blood donors with arterial hypertension are characterized by the absence of a single, legally fixed "European threshold" for blood pressure; instead, selection criteria are shaped within national regulatory and organizational frameworks. Despite this variability, a value of approximately 180/100 mmHg is commonly used as a practical reference, particularly in systems where blood pressure measurement is part of mandatory pre-donation screening (Ringdal et al., 2022b). At the same time, major European guidance documents, including the Guide to the Preparation, Use and Quality Assurance of Blood Components issued by the European Directorate for the Quality of Medicines & HealthCare (EDQM), emphasize that systematic measurement of blood pressure and pulse is not a mandatory requirement for determining donor eligibility. This allows for a more flexible, clinically oriented approach based on individual risk assessment (European Directorate for the Quality of Medicines & HealthCare, 2025).

In continental Europe, several countries use threshold-based models with clearly defined numerical limits. Germany and Italy are representative examples, where eligibility for blood donation is generally determined at systolic blood pressure values up to 180 mmHg and diastolic values up to 100 mmHg, with medical judgment applied in borderline cases. National transfusion and health authorities in these

countries use these values as reference points for donor safety, resulting in a hybrid model that combines numerical thresholds with clinical discretion (Bundeszentrale für gesundheitliche Aufklärung, 2023; Ministero della Salute, 2023).

In addition, some European countries use a more restrictive or “intermediate” selective approach in which values above a given level do not automatically lead to definitive exclusion but require mandatory medical assessment. Such an approach is formally described in France, where temporary non-acceptance on the day of donation is provided for resting blood pressure >180 mmHg systolic and/or >100 mmHg diastolic, while at values >160/90 mmHg donation may be permitted at the discretion of the physician in the transfusion service (République Française, 2016).

The Scandinavian countries illustrate a more dynamic and evolving approach. In Norway, policies have gradually shifted from more restrictive rules for donors with arterial hypertension and those receiving antihypertensive treatment toward a more liberal, risk-adapted model. This development is based on accumulating empirical evidence showing no increased risk of adverse reactions in donors with well-controlled hypertension and demonstrates how national practice can evolve in response to scientific evidence and the needs of the donor system (Ringdal et al., 2022b).

3.5. Summary of the literature synthesis

The literature identifies two predominant models for selecting blood donors with arterial hypertension:

(1) a regulatory threshold-based framework based on specific numerical blood pressure values;

(2) a clinically oriented framework in which disease and treatment stability, absence of symptoms, and absence of hypertensive complications are the principal considerations.

Both approaches broadly share the view that controlled arterial hypertension is not a contraindication to blood donation when an adequate individual assessment of donor risk is performed.

3.6. Bulgaria – regulatory framework and position within European models

Against the background of European variability, national systems determine the specific thresholds and mechanisms used for pre-donation assessment. In the Republic of Bulgaria, eligibility for blood donation in individuals with arterial hypertension is governed by a clearly formalized regulatory framework set out in the medical standard “Transfusion Hematology,” approved by Ordinance No. 9 of 25 April 2006 of the Ministry of Health, as subsequently amended. Under this standard, assessment of a prospective donor’s health status includes a mandatory pre-donation medical examination in which blood pressure measurement is an obligatory component.

The regulation states that individuals with systolic blood pressure up to 180 mmHg and diastolic blood pressure up to 100 mmHg are eligible to donate. Values above these limits are grounds for temporary deferral unless an individual medical assessment documents that donation does not pose a risk to the donor’s health (Ministry of Health of the Republic of Bulgaria, 2006). The Bulgarian system therefore applies a regulatory threshold-based framework in which numerical blood pressure values play a central role in donor selection.

From a practical perspective, this model provides a high degree of uniformity in eligibility criteria across blood centers and mobile teams throughout the country. Clearly defined thresholds facilitate the work of healthcare professionals involved in donor screening and reduce subjective differences in assessment between individual services. This is particularly important in a decentralized blood donation system and when large numbers of donors are being assessed. At the same time, the Bulgarian regulatory framework does not formally define an intermediate threshold (for example, around 160/90 mmHg) that would serve as a warning zone requiring greater caution and more detailed clinical assessment, as is provided in some other European countries such as France. Consequently, the model can be described as more strictly threshold based, with limited flexibility in borderline or situationally elevated blood pressure, for example in white-coat hypertension or stress before donation.

Within the spectrum of European practice, Bulgaria is positioned close to continental European countries that use similar numerical thresholds, such as Italy and Germany, and determine eligibility largely on the basis of blood pressure values measured at the time of donation. In contrast to the clinically oriented models used in the United Kingdom and Ireland, where disease stability, symptoms, and changes in therapy play a leading role, Bulgarian practice places greater emphasis on objectively measurable indicators defined at regulatory level.

In summary, the Bulgarian system for selecting blood donors with arterial hypertension is characterized by clear regulatory provisions, a high degree of standardization, and a threshold-based model using a limit of 180/100 mmHg. This approach provides predictability and organizational consistency but raises the question of whether more flexible mechanisms for

individual clinical assessment should be introduced for donors with well-controlled hypertension, in line with trends in contemporary European transfusion practice.

4. DISCUSSION

4.1. Clinical safety and control of arterial hypertension in blood donation

Epidemiological, clinical, and observational evidence accumulated over the past decade consistently supports the view that controlled arterial hypertension is not an independent risk factor for serious adverse reactions to blood donation when the donor is clinically stable and antihypertensive therapy has remained unchanged (J. M. Johnsen et al., 2023; Newman, 2013a). Contemporary cohort and observational studies, including Scandinavian population analyses, do not show an increased frequency of severe hemodynamic complications in hypertensive donors compared with normotensive donors, provided that blood pressure is adequately controlled and there is no target-organ damage (K. M. N. Johnsen et al., 2023; Nissen-Meyer & Seghatchian, 2019; Stainsby et al., 2010). Physiological adaptation to moderate acute volume loss during blood donation further supports this conclusion. Current experimental and clinical data indicate that, in healthy and compensated individuals, whole-blood donation produces moderate and transient changes in peripheral blood pressure without substantial impairment of central hemodynamics, aortic pressure, or vascular stiffness (Thibeault et al., 2025). This is directly relevant to donors with well-controlled hypertension, in whom compensatory mechanisms are generally preserved and allow the donation procedure to be completed safely.

Accumulating evidence does not support a causal relationship between blood donation and the development or worsening of arterial hypertension. Instead, the main risk profiles are associated predominantly with vasovagal reactions rather than elevated blood pressure. Particularly informative in this context is the large national retrospective case-control study by Wang et al., which included 1,253,678 blood donations between 2010 and 2013. The authors reported an extremely low rate of adverse reactions (0.1%); in multivariable analysis, lower pre-donation systolic blood pressure (<124 mmHg), rather than elevated values, was identified as an independent risk factor for adverse events. In contrast, pre-donation diastolic blood pressure ≥ 75 mmHg was not associated with increased risk, calling into question traditionally restrictive approaches to donors with controlled hypertension (Wang et al., 2019).

These objective clinical findings are complemented by the donor perspective examined in the national survey by Makowicz et al., which included 2,387 voluntary blood donors. The authors reported that 89.7% of respondents did not consider regular blood donation likely to increase arterial blood pressure, and confidence in this view increased significantly with greater donation experience ($p < 0.001$). Although the study was based on subjective self-assessment and did not include direct clinical measurements, its findings are consistent with observational and clinical data indicating no adverse effect of blood donation on blood pressure in clinically stable individuals (Makowicz et al., 2022).

In this context, equating the diagnosis of arterial hypertension with increased donor risk without sufficient clinical justification may lead to overly cautious decisions and unnecessary restriction of the donor pool. The contemporary evidence-based model supports a shift from a diagnosis-oriented to a function-oriented approach, in which current hemodynamic stability, symptoms, and changes in therapy are more important than the formal diagnostic label (Newman, 2013a).

Epidemiological data from a large donor study in the United States further highlight the importance of definitional and organizational factors in assessing arterial hypertension in transfusion practice. An analysis of more than 116,000 blood donors showed that application of the updated 2017 ACC/AHA (American College of Cardiology/American Heart Association) criteria would classify more than half of donors as hypertensive, including approximately 47% of individuals aged 20–44 years (Housekeeper et al., 2020). This clearly demonstrates the need to distinguish between the diagnostic classification of arterial hypertension and blood donor eligibility criteria, which should be based on actual functional risk. At the same time, the high frequency with which elevated blood pressure is detected positions blood donation centers as an effective platform for public health screening and health promotion without necessarily requiring unjustified restriction of the donor pool.

4.2. Role of antihypertensive therapy in donor risk assessment

Analysis of the current literature indicates that antihypertensive therapy itself does not increase the risk of adverse reactions when it is stable and well tolerated (Joint Professional Advisory Committee, 2022; K. M. N. Johnsen et al., 2023). On the contrary, effective pharmacological blood pressure control may be considered a factor contributing to donor safety by reducing blood pressure variability and the risk of extreme hemodynamic responses (European Directorate for the Quality of Medicines & HealthCare,

2023). In practice, however, different drug classes may have different implications for donor selection. For example, beta-blockers may limit compensatory tachycardia during acute volume loss, warranting closer assessment of heart rate and symptoms, whereas diuretics require attention to hydration status (McEvoy et al., 2024). These considerations support the need for a careful clinical interview and professional interpretation rather than formal application of universal exclusion criteria.

Contemporary transfusion guidelines increasingly position antihypertensive treatment as part of the overall clinical assessment rather than as an independent reason for deferral, consistent with the concept of risk-adapted donor selection (European Directorate for the Quality of Medicines & HealthCare, 2023; Joint Professional Advisory Committee, 2022).

4.3. Organizational consequences of threshold-based models and donor deferral

From an organizational perspective, arterial hypertension is among the leading causes of temporary deferral from blood donation in many national transfusion systems, particularly where blood pressure is routinely measured before donation and fixed numerical thresholds are applied. Available empirical evidence suggests that automatic deferral based on a single measurement outside a predefined range does not substantially reduce the frequency of adverse reactions, while it may have a clear negative effect on donor retention and repeat donation (D. S. Lamba et al., 2023; Maghsudlu et al., 2024; R. Lamba et al., 2023; Thibeault et al., 2025).

This effect is particularly relevant in individuals with labile or situationally elevated blood pressure, including white-coat hypertension, increased emotional stress before donation, or physical exertion immediately before assessment (McEvoy et al., 2024). In transfusion systems with limited clinical flexibility, such donors may be deferred repeatedly, which can ultimately result in the loss of potential regular donors and additional pressure on blood supplies. In this context, the regulatory and conceptual analysis by Debecho and Hailu further supports reconsideration of strictly threshold-based models. The authors emphasize that treated, clinically stable arterial hypertension is not a contraindication to blood donation provided that blood pressure is within acceptable limits at the time of donation and does not show marked fluctuations. Particular attention is drawn to the risk of unjustified deferral based on a single measurement in situations characteristic of the donor setting, such as white-coat hypertension, supporting the need for individualized, clinically oriented assessment rather than formal application of fixed numerical thresholds (Debecho & Hailu, 2019).

In response to these organizational and clinical challenges, some transfusion systems have introduced more flexible models of pre-donation assessment, including repeat measurement after a short period of rest, clinical triage, or selective measurement. Available data suggest that these approaches may achieve a better balance between donor safety and the availability of blood components without compromising safety (Canadian Blood Services, n.d.). Blood pressure is therefore retained as an important risk indicator but interpreted as part of a broader clinical and organizational assessment tailored to the donor's individual functional profile.

4.4. Clinically oriented versus regulatory threshold-based models – comparative analysis

Comparison of international practice identifies two conceptually different but partly overlapping models. Regulatory threshold-based models provide a high degree of standardization, legal clarity, and operational predictability, which is particularly important in large and decentralized systems, but they limit individualized clinical assessment in borderline cases (Bundesärztekammer, 2023; U.S. Food and Drug Administration, 2026). Clinically oriented models, used in the United Kingdom, Ireland, and some Scandinavian countries, provide greater flexibility and allow more precise differentiation between actual and potential risk, but they require a higher level of clinical competence and organizational resources (Irish Blood Transfusion Service, n.d.; Joint Professional Advisory Committee, 2026).

Current scientific evidence does not demonstrate the clear superiority of either model in terms of safety, but it does indicate that excessive restrictiveness does not produce proportional benefits, while risk-adapted approaches can optimize donor selection without compromising safety.

4.5. Professional aspects and the role of healthcare professionals

In risk-adapted donor selection, healthcare professionals play a key role. Accurate blood pressure measurement, recognition of symptoms associated with hemodynamic instability, assessment of treatment stability, and appropriate donor information are critical elements in evidence-based decision-making (European Directorate for the Quality of Medicines & HealthCare, 2025). A review of the literature indicates that the quality of pre-donation screening depends not only on fixed numerical limits but also on clinical competence and consistency in the application of assessment algorithms, underscoring the need for targeted training and standardized yet flexible protocols.

In the Bulgarian context, the regulatory threshold-based model using a limit of 180/100

mmHg provides clarity and uniformity but also restricts opportunities for individualized clinical judgment in donors with well-controlled hypertension and situationally elevated values. In light of international evidence, this raises the possibility of introducing intermediate clinical mechanisms—such as repeat measurement after a short rest, assessment of symptoms, and evaluation of treatment stability—which could improve the effectiveness of donor selection without compromising safety.

5. CONCLUSION

Comparison of international practices indicates that well-controlled arterial hypertension is not, in itself, a contraindication to blood donation. Eligibility should be determined by blood pressure at the time of assessment, hemodynamic stability, stability of antihypertensive therapy, and the absence of clinical complications rather than by the formal presence of the diagnosis.

International practice broadly follows two approaches: a regulatory threshold-based model using clearly defined numerical limits and a clinically oriented model based on symptoms, stability, and changes in treatment. Both seek to balance safety with preservation of the donor pool, although excessive restrictiveness may result in unnecessary deferral when blood pressure is situationally elevated.

In conclusion, optimization of blood donation criteria for donors with arterial hypertension should be based on individualized risk assessment and an evidence-based balance between protecting donor health and maintaining a sustainable donor pool—an essential condition for the reliable functioning of modern transfusion systems.

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