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Blood donation – history, organizational structure, availability, and trends in Poland

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ABSTRACT

Blood donation plays a crucial role in ensuring the health security of Polish society. It enables the saving of patients in life-threatening conditions and the treatment of individuals requiring regular blood transfusions. This review outlines the origins of blood donation in Poland, beginning in 1935 when the first blood collection initiatives were launched, up to the present day, with a well-developed public blood service system in place. The paper discusses the current organizational structure of both civilian and military blood collection, the role of Regional Blood Donation and Blood Treatment Centers (pol. Regionalne Centrum Krwiodawstwa i Krwiolecznictwa – RCKiK), and the operational principles of the National Blood Center (pol. Narodowe Centrum Krwi). Attention is drawn to the availability of blood in RCKiK storage facilities, with particular emphasis on the shortage of type O Rh– blood, which is the most universal and frequently needed in emergency situations. The study highlights a major challenge facing the Polish blood donation system: the continuous increase in demand for blood due to an aging population.
Keywords: blood donation; history; organizational structure; blood self-sufficiency; healthcare system; voluntary blood donors.

INTRODUCTION

In a healthy adult, it takes an average of about 60 s for blood to circulate through the entire circulatory system. This process, known as systemic and pulmonary circulation, begins in the heart, which acts as a central pump, maintaining a continuous flow of blood [1]. Blood is an extremely important fluid for the body due to its many functions, which include transporting oxygen and carbon dioxide, nutrients and hormones. It is also responsible for maintaining homeostasis in the body and eliminating waste products [2, 3].

Despite the continuous development of medicine, no substitute for natural blood has been developed to date. The artificial blood produced so far is only equivalent to red blood cells, which is why it is intended solely for the transport of oxygen and carbon dioxide throughout the human body. For years, new methods have been developed to obtain whole blood rich in all its natural components, i.e. red blood cells, white blood cells, platelets and plasma. Substances currently in clinical trials have significant limitations – one of them is their short half-life, ranging 20–30 h, while their natural counterpart has a much longer biological shelf life of approx. 34 days [4, 5].

The term 'blood transfusion' refers to the medical use of whole blood or its components for the treatment of patients. To ensure the safety of blood products, it is essential to carefully select donors and conduct comprehensive tests in accordance with applicable procedures and standards of blood donation services [6]. Blood transfusion is indispensable during surgical procedures, including transplantology, the treatment of patients with haematological cancers and congenital and acquired blood deficiencies [7]. The latest report published by the World Health Organization (WHO) presents data showing that ageing populations, including Poland, generate a greater demand for blood transfusions, with particular emphasis on chronic diseases typical of old age, surgery and the aforementioned oncological treatment. As the population ages, there is an increase in the demand for blood transfusions [8, 9]. Blood transfusion in medical facilities is one of the most frequently performed medical procedures in recent years. Its increased popularity is due to a reduction in the risk of bacterial and parasitic contamination, improved recipient safety, and faster diagnosis and treatment of complications [10, 11].

MATERIALS AND METHODS

The authors of the study conducted a detailed analysis of the available scientific literature, institutional reports and statistical data on blood donation in Poland. The source material included publications available in databases such as PubMed and Google Scholar, as well as national documents from the National Blood Centre, the Ministry of Health (pol. Ministerstwo Zdrowia – MZ), the Institute of Haematology and Transfusion Medicine (pol. Instytut Hematologii i Transfizjologii – IHiT), and Regional Blood Donation and Blood Treatment Centres RCKiK. Works that did not take into account the Polish context and unverified sources were excluded. The analysis was qualitative in nature and consisted of a critical review of the content of selected publications and websites of the aforementioned institutions.

The aim of this review article is to provide a comprehensive analysis of the blood donation system in Poland, with particular emphasis on its history, organisational structure, accessibility and trends related to blood donation. The literature review also allows for the identification of key challenges facing the Polish blood donation system and indicates potential directions for its development in the context of the growing health needs of society.

THE HISTORY OF BLOOD DONATION IN POLAND

The year 2025 marks the anniversary of blood donation in Poland. Exactly 90 years ago, on the initiative of the Polish Red Cross (pol. Polski Czerwony Krzyż – PCK), the first medical facility in Poland dealing with transfusion medicine was established. The Institute for Blood Collection and Preservation was established in 1935 in Warsaw, at the PCK Main Hospital, located at 6 Smolna Street [12]. A year later, the Central Accident Station was organised in Łódź, which included the Blood Transfusion Centre. The third and last blood collection centre before World War II was established in 1937 in Krakow [13]. Also in the same year, the first legal act regulating blood donation was issued by the then Minister of Social Welfare [14]. In 1938, the above-mentioned centres dealing with blood collection and transfusion to patients had about 1,000 regular blood donors [15]. During the war, the demand for blood grew steadily. Blood collection campaigns were organised for wounded soldiers and civilians. People came forward en masse to help those in need. Blood donation during the war was not only a life-saving medical procedure, but also an expression of courage and solidarity with those on the front lines. This was an extremely difficult time due to dwindling blood reserves, when every unit of blood was priceless.

Faced with a shortage of blood, medical staff are forced to prioritise those in need [16]. Blood donation enjoyed growing popularity, and so over the years the number of blood donors has steadily increased and continues to rise to this day (Tab. 1). The decline in the period 1950–1960 was probably related to the takeover of the blood donation infrastructure by the communist authorities in 1951 and the abolition of paid blood donation in favour of voluntary donation [17, 18].

TABLE 1. Development of blood donation in Poland (1938–1986) (own elaboration based on references [13, 15, 16])

Year	Number of HDK clubs	Number of blood donors
1939	3	1000
1950	14	6500
1960	26	800
1970	374	20944
1980	3986	328608
1986	4415	353724

CONTEMPORARY CIVILIAN BLOOD DONATION

The current blood donation system in Poland has been centralised since 1999. In that year, provincial blood donation stations were transformed into RCKiK. The RCKiK took over blood donation points from hospitals, which now operate as Local Branches (pol. Oddziały Terenowe – OT). Following the amendment of the Act in 2003, the supervisory role in the field of blood donation and blood therapy was taken over by the IHiT Medicine based in Warsaw, and since 2006, the newly established National Blood Centre [19]. The RCKiK headquarters are located in 16 provincial capitals (Białystok, Bydgoszcz, Gdańsk, Katowice, Kielce, Kraków, Lublin, Łódź, Olsztyn, Opole, Poznań, Szczecin, Wałbrzych, Warsaw, Wrocław, Zielona Góra) and in 5 county towns (Kalisz, Racibórz, Radom, Słupsk, Wałbrzych) [20] – Figure 1.

FIGURE 1. Regional blood donation and blood treatment centers on the map of Poland (own elaboration based on reference [20])

In the above-described structure of the civil blood transfusion system, the Ministry of Health performs supervisory and coordinating functions. The National Blood Center (pol. Narodowe Centrum Krwi) supervises the organisation of blood collection, separation of blood components and the supply of blood and blood products, while the IHiT conducts scientific research and development work on blood donation and blood transfusion and implements the results obtained in practice [21, 22] – Figure 2.

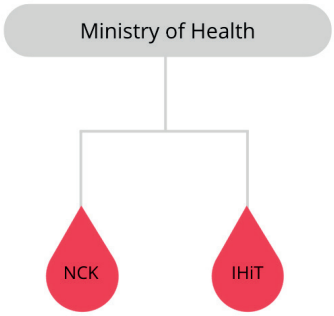

FIGURE 2. Structure of civilian blood donation

CONTEMPORARY BLOOD DONATION BY UNIFORMED SERVICES

The structure of the blood donation system for uniformed services differs significantly from that of civilian services. It consists of 2 ministries supervising blood donation: the Ministry of National Defence (pol. Ministerstwo Ochrony Narodowej – MON) and the Ministry of the Interior and Administration (pol. Ministerstwo Spraw Wewnętrznych i Administracji, MSWiA). Ministry of National Defence is subordinate to the aforementioned IHiT, which is a scientific and research institution, and the Military Blood Donation and Blood Treatment Centre (pol. Wojskowe Centrum Krwiodawstwa i Krwiolecznictwa – WCKiK), established in 2005 pursuant to the MON Regulation of 28 October 2004 on the establishment of the Military Blood Donation and Blood Treatment Centre, Journal of Laws of 2004, No. 243, item 2433 [23]. The WCKiK is responsible, among other things, for the adequate supply of blood and blood components to the armed forces [24]. The Ministry of Internal Affairs and Administration also exercises control over the IHiTand the WCKiK of the MSWiA, which supplies blood to subordinate services such as the Police and the Fire Brigade [25, 26] – Figure 3.

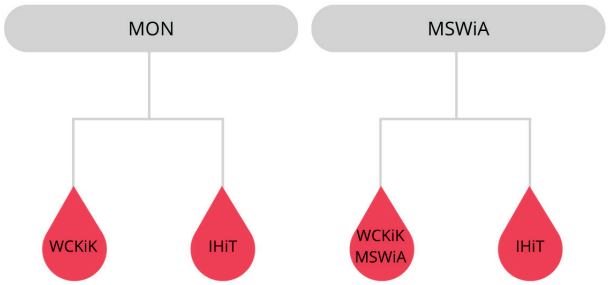

FIGURE 3. Structure of blood donation in uniformed services

Currently, the uniformed services blood donation service consists of the Warsaw Medical Team with a branch on Nowomiejska Street and 7 field stations located in Bydgoszcz, Ełk, Gdańsk, Kraków, Lublin, Szczecin and Wrocław (Fig. 4) [27].

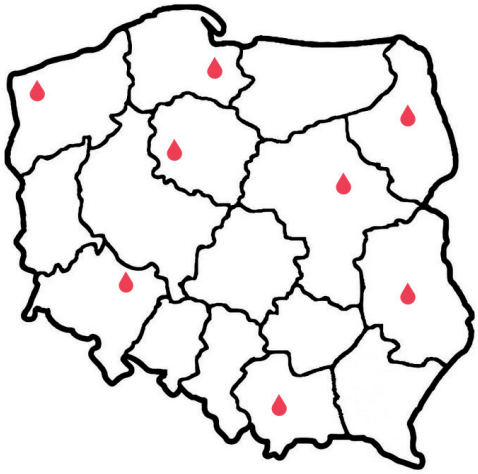

FIGURE 4. Locations of the military blood donation and blood treatment center on the map of Poland (own elaboration based on reference [27])

BLOOD AVAILABILITY

Blood self-sufficiency means that patients' needs for safe blood, blood components and blood products are met at the national level, in a timely manner and with equal access to transfusions. Striving for full self-sufficiency is a key element of the strategy to ensure adequate supplies of blood and blood components. The essence of this concept is to base the blood donation system entirely on voluntary and unpaid donations [28]. In 2023, the number of people who donated blood was 729,008, an increase of 2.4% compared to the previous year 711,801 people in 2022. Of all the donors who came forward, 639,972 were eligible to donate blood, compared to 621,936 in 2022. An analysis of the donor structure in 2023 showed that: 126,595 people donated blood for the first time, which accounted for 19.78% of all qualified donors, 423,666 people were regular multiple donors 66.20%, 89,711 people were other multiple donors 14.02%. For comparison, in 2022 there were: 135,962 first-time donors 21.86%, 399,172 regular multiple donors 64.18%, and 86,802 other multiple donors 13.96%. There is a significant predominance of multiple donors in the blood donor population, with a simultaneous decline in the proportion of first-time donors. This trend may be important for planning activities to promote blood donation and for strategies to recruit new donors [29].

The availability of individual blood groups in Poland is closely related to their prevalence in the Polish population and the current needs of the healthcare system. The most common blood groups are A Rh+ and 0 Rh+, which together account for more than half of all donors [30, 31]. Particular attention should be paid to Rh– groups. Due to their low prevalence, stocks of these blood groups are particularly vulnerable to shortages. This is especially true for the 0 Rh– group, which acts as a universal whole blood donor and is essential in emergency situations when there is no time to determine the recipient's blood group [32]. Current data indicate that Rh– groups are most often classified as urgently needed, and their availability in blood donation centres is sometimes critically low (Tab. 2). Blood stocks are monitored on an ongoing basis, and information on the availability of individual groups is published on websites [33, 34, 35].

TABLE 2. Frequency of blood group occurrence in Poland (own elaboration based on references [36])

Blood group (AB0 and Rh system)	Frequency of occurrence
0 Rh+	31%
0 Rh–	6%
A Rh+	32%
A Rh–	6%
AB Rh+	7%
AB Rh–	1%
B Rh+	15%
B Rh–	2%

TRENDS AND DEMAND FOR BLOOD

Statistics published by the WHO in 2011 reported 82 mln blood donations, of which approx. 50% were obtained in high-income countries. However, an analysis from 2025 indicates 118.5 mln units of blood donated, including 40% in high-income countries [37]. In view of the projected decline in Poland's population, the number of people eligible to donate blood will decrease, while the demand for blood will increase due to the growing group of patients requiring treatment [38, 39]. Between 2005 and 2022, there has been a clear shift in the structure of blood collection. The share of collections at RCKiK headquarters increased from 22.8% in 2005 to 30.25% in 2022, reaching its highest level of 31.0% in 2021 (Tab. 3). This increase may indicate the growing importance of permanent collection points, better infrastructure accessibility and greater public trust in central facilities. Local branches, although their share fluctuated slightly, maintain a stable position in the Polish blood donation system.

The increase in their share in recent years may be the result of decentralisation measures and the development of local collection points. The most noticeable is the decline in the percentage share of outbound actions, despite the growing number of outbound actions [40]. From 4,406 trips in 2002, there was an increase to 12,089 trips in 2022. In 2015, they accounted for 27.2% of all collections, while in 2022 their share decreased to 19.56%. This trend may be related to logistical constraints, organisational changes and the impact of the COVID-19 pandemic, which significantly reduced the mobility of blood collection teams.

TABLE 3. Blood collection sites in selected years (own elaboration based on reference [40])

Year	RCKiK branch	Local branches	Field operations
2005	22.800%	55.200%	22.000%
2006	25.400%	51.600%	23.000%
2007	25.400%	49.300%	25.300%
2008	25.244%	49.258%	25.498%
2009	27.343%	48.139%	24.517%
2010	25.798%	49.106%	25.096%
2011	26.647%	48.787%	24.566%
2012	27.146%	47.745%	25.109%
2013	27.127%	46.672%	26.201%
2014	27.003%	46.447%	26.549%
2015	26.742%	46.058%	27.200%
2016	27.361%	46.017%	26.622%
2017	27.973%	45.422%	26.605%
2018	28.474%	44.851%	26.674%
2019	28.750%	45.250%	26.000%
2020	30.620%	46.840%	22.540%
2021	31.000%	49.010%	19.990%
2022	30.250%	50.190%	19.560%

COMPARISON OF THE BLOOD DONATION SYSTEM IN POLAND WITH SOLUTIONS IN OTHER EUROPEAN UNION COUNTRIES

Regulations concerning the blood donation system are governed by both national and international standards. Due to this, specific procedures may vary from country to country. In order to ensure the highest standard of service, the WHO cooperates with the European Commission, the Council of Europe/European Directorate for the Quality of Medicines and HealthCare (CoE/EDQM) and the European Centre for Disease Prevention and Control (ECDC). In European Union countries, blood donation systems must also comply with EU regulations [41].

VOLUNTARY AND UNPAID BLOOD DONATION

A study by Stock et al. conducted on the German population characterised the factors motivating and demotivating potential blood donors [42]. It was found that the most important factor motivating people to become donors was having a blood donor among their family and friends. Increased susceptibility was also noted among organ donors. In turn, the most common factors excluding blood donation are lack of time and motivation to donate blood, as well as fear of needles and possible physical consequences. Another German study published in the "International Journal of Environmental Research and Public Health" revealed that education level, gender and age play a significant role in becoming a blood donor [43]. Men with higher levels of education, aged 45–54, were most likely to report experience with blood donation and/or a willingness to undertake a similar initiative in the future. The main motivating factor for donors was the desire to help another person. Women over 55 years of age constituted the largest group of non-donors. Kocic et al., in their analysis of students from 14 faculties of the University of Novi Sad, proved that early education on blood donation increases the number of people willing to take this initiative in the future [44]. In addition, blood donation programmes should be conducted in such a way as to enable the participation of as many potential donors as possible. This can be achieved by conducting educational campaigns on blood donation, e.g. in GP surgeries, in the form of posters encouraging participation in the programme. However, in the study by Renaux et al., this type of campaign had only modest results [45]. There is also inconclusive empirical evidence in the context of incentives offered to people who decide to donate their blood. In a publication by Graf et al., the authors examined the frequency of offering specific incentives to blood donors [46]. The most common form of incentive was time off work for the duration of the blood donation, depending on arrangements with the employer. Other benefits included a day off work, vouchers or gift cards, cash, tax or pension benefits, as well as high-value remuneration exceeding 15 €/USD and COVID-19 antibody tests. Their role in motivating potential donors should be further investigated, especially at the national level.

WASTAGE

The study by Body et al. presented possible methods of intervention to reduce the wastage of blood products [47]. This wastage was mainly related to the improper handling of red blood cell (RBC) samples in hospital settings. The transport of patients between wards with RBCs and improper storage and transport methods were the most common causes of RBC waste. In the above analysis, the units generating the largest amount of RBC waste were, in order, operating theatres, intensive care units and hospital emergency departments. It is necessary to implement strategies to prevent the waste of RBC units due to ethical dilemmas and financial losses. A survey conducted in 30 different countries in 2014–2015 by the International Society of Blood Transfusion revealed that the waste of blood products is relatively low worldwide [48]. The highest waste rate was documented for platelets, while the lowest was for RBCs. In a Polish pilot study conducted between 2005 and 2022, only a statistically significant decrease in platelet waste was recorded [49]. In 2005, this percentage was 38.9%, which was the highest value in all the years studied. Since 2011, a centralised surveillance system has been implemented, enabling the Quality Assurance Department (QAD) to control waste in individual blood donation centres. This supervision is carried out by one of the bodies of the Polish Institute of IHiT. This enables a reduction in the generation of blood-derived waste and better management of blood components.

SUMMARY

Blood donation in Poland is an important part of the healthcare system, ensuring access to safe blood and blood components for patients requiring transfusion therapy. An analysis of the available literature has revealed changes over the years in the structure of blood collection sites, with a noticeable increase in the importance of stationary collection points (RCKiK headquarters and field branches) and a decrease in the share of mobile collection campaigns. The observed increase in the number of blood donors may not meet the system's needs in the coming years due to the growing proportion of elderly people. In terms of the availability of individual blood groups, Rh– groups are of particular importance, as they are often in short supply due to their rarity, especially the 0Rh– group. This requires constant monitoring of stock levels and targeted educational and recruitment campaigns.

Ensuring self-sufficiency in blood and blood components requires a comprehensive approach, including both organisational measures by individual blood donation units and social measures aimed at promoting voluntary blood donation among adults. Education and infrastructure development are key here, as is adapting strategies to changing demographic and epidemiological realities, including increasing the number of mobile blood drives and extending the opening hours of collection points so that working people are also able to attend. Furthermore, cooperation with local institutions such as volunteer fire brigades, community centres, workplaces and large companies should be considered. In the next dozen or so years, the future of the system will depend on our ability to build a modern, solidarity-based model of blood management – focused on people and their needs.

REFERENCES

1. Gillen AL, Conrad J. Life is in the Blood. Liberty University, Faculty Publications and Presentations 2019:148. https://digitalcommons.liberty.edu/bio_chem_fac_pubs/148 (23.07.2025).
2. Institute for Quality and Efficiency in Health Care (IQWiG). In brief: What does blood do? 2006. https://www.ncbi.nlm.nih.gov/books/NBK279392/ (23.07.2025).
3. Fdil N. Blood physiology and its functions. J Contemp Med Educ 2022;12(7):1.
4. Sarkar S. Artificial blood. Indian J Crit Care Med 2008;12(3):140-4. doi: 10.4103/0972-5229.43685.
5. Khan F, Singh K, Friedman MT. Artificial Blood: The History and Current Perspectives of Blood Substitutes. Discoveries (Craiova) 2020;8(1):e104. doi: 10.15190/d.2020.1.
6. Shubha A. Blood transfusion. Medicine 2009;37(3):172-6. doi: 10.1016/j.mpmed.2009.01.012.
7. System krwiodawstwa wrażliwy na kryzysy. Najwyższa Izba Kontroli. 2024. https://www.nik.gov.pl/aktualnosci/zdrowie/system-krwiodawstwa-krew-i-jej-skladniki.html (23.07.2025).
8. Global status report on blood safety and availability 2021. Geneva: World Health Organization; 2021. https://iris.who.int/bitstream/handle/10665/356165/9789240051683-eng.pdf?sequence=1 (23.07.2025).
9. Carson JL, Grossman BJ, Kleinman S, Tinmouth AT, Marques MB, Fung MK, et al. Red blood cell transfusion: a clinical practice guideline from the AABB. Ann Intern Med 2012;157(1):49-58. doi: 10.7326/0003-4819-157-1-201206190-00429.
10. Lotterman S, Sharma S. Blood Transfusion. Treasure Island (FL): StatPearls Publishing 2025. https://www.ncbi.nlm.nih.gov/books/NBK499824/ (23.07.2025).
11. Friedman MT, Avadhani V, Gilmore S, Madrigal E. Blood Transfusion in the 21st Century. Discoveries (Craiova) 2014;2(1):e11. doi: 10.15190/d.2014.3.
12. Obchodzimy 90-lecie krwiodawstwa w Polsce. Polski Czerwony Krzyż. 2025. https://pck.pl/polski-czerwony-krzyz/aktualnosci/90-lecie-krwiodawstwa-w-polsce (23.07.2025).
13. Geneza i ewolucja ruchu honorowego krwiodawstwa Polskiego Czerwonego Krzyża. Małopolski Oddział Okręgowy Polskiego Czerwonego Krzyża. https://pck.malopolska.pl/geneza-ewolucja-ruchu-honorowego-krwiodawstwa-polskiego-czerwonego-krzyza/ (23.07.2025).
14. Początki 90-letniej historii krwiodawstwa w Polsce. Małopolski Oddział Okręgowy Polskiego Czerwonego Krzyża. 2025. https://pck.malopolska.pl/poczatki-90-letniej-historii-krwiodawstwa-w-polsce/ (23.07.2025).
15. Honorowe Krwiodawstwo Polskiego Czerwonego Krzyża 1935–2000. Polski Czerwony Krzyż, Klub Honorowych Dawców Krwi przy Urzędzie Miejskim w Karczewie. http://www.hdkkarczew.pl/honorowe-krwiodawstwo-polskiego-czerwonego-krzyza-1935-2000/ (23.07.2025).
16. Krwiodawstwo. Stowarzyszenie Honorowych Dawców Krwi Legion. https://legionhdk.pl/krwiodawstwo/krwiodawstwo-art (23.07.2025).
17. Historia PCK. Polski Czerwony Krzyż. https://pck.pl/polski-czerwony-krzyz/historia/ (23.07.2025).
18. Rys historyczny [Internet]. Regionalne Centrum Krwiodawstwa i Krwiolecznictwa w Gdańsku. https://krew.gda.pl/rys-historyczny,160,pl.html (23.07.2025).
19. Ustawa z dnia 22 sierpnia 1997 r. o publicznej służbie krwi. Dz.U. z 1997 r., nr 106, poz. 681, 22.08.1997, p. 1-41. https://isap.sejm.gov.pl/isap.nsf/DocDetails.xsp?id=wdu19971060681 (23.07.2025).
20. Mapa punktów krwiodawstwa w których można oddać krew. Honorowe krwiodawstwo i krwiolecznictwo. https://krwiodawcy.org/gdzie-mozna-oddac-krew (23.07.2025).
21. Misja. Narodowe Centrum Krwi. 2022. https://www.gov.pl/web/nck/misja (23.07.2025).

22. Publiczna służba krwi. Serwis Rzeczypospolitej Polskiej. 2018. https://www.gov.pl/web/zdrowie/publiczna-sluzba-krwi1#:~:text=G%C5%82%C3%B3wne%20zadania%20Instytutu%20Hematologii%20i%20Transfuzjologii%20w,powa%C5%BCnych%20niepo%C5%BC%C4%85danych%20zdarze%C5%84%20i%20powa%C5%BCnych%20niepo%C5%BC%C4%85danych%20reakcji (23.07.2025).
23. Rozporządzenie Ministra Obrony Narodowej z dnia 28 października 2004 r. w sprawie utworzenia Wojskowego Centrum Krwiodawstwa i Krwiolecznictwa. Dz.U. z 2004 r., nr 243, poz. 2433, 28.10.2004, p. 1-2. https://isap.sejm.gov.pl/isap.nsf/DocDetails.xsp?id=WDU20042432433 (23.07.2025).
24. O nas. Wojskowe Centrum Krwiodawstwa i Krwiolecznictwa. https://wckik.pl/wp/o-nas/ (23.07.2025).
25. Kaczmarek K. System krwiodawstwa w Polsce. Poznań: Uniwersytet im. Adama Mickiewicza w Poznaniu; 2022. https://repozytorium.amu.edu.pl/server/api/core/bitstreams/c91f3f57-dec0-40b3-ad95-e47f20b9ee4b/content (23.07.2025).
26. Cele i zadania CKiK. Centrum Krwiodawstwa i Krwiolecznictwa MSWiA. https://ckikmswia.pl/o-ckik/cele-i-zadania-ckik/ (23.07.2025).
27. Jedynak AE, Klamrowski P, Olszewski A, Koper D, Sienkiewicz Z, Kryczka T. Krwiodawstwo i krwiolecznictwo wojskowe w Polsce. Piel Chir Angiol 2020;2:64-9.
28. Pogłód R, Rosiek A, Grabarczyk P, Łętowska M. Charakterystyka podstawowych wskaźników dotyczących krwiodawstwa i krwiolecznictwa w Europie – aktualne wyzwania i działania. J Transfus Med 2015;8(2):60-77. doi: 10.5603/jtm.42499.
29. Rosiek A, Nieradkiewicz A, Lachert E, Goczyńska P, Lasocka J, Mikołowska A, et al. Blood transfusion service in Poland in 2023. J Transfus Med Hemost 2024;17(4):147-67. doi: 10.5603/jtm.103979.
30. Mitra R, Mishra N, Rath GP. Blood groups systems. Indian J Anaesth 2014;58(5):524-8. doi: 10.4103/0019-5049.144645.
31. Tekle E, Adisu Y, Rikitu D, Teferi S, Fikadu A, Kifle E. ABO and Rh (D) blood group phenotype distribution pattern among blood donors at the Nekemte Blood Bank, Oromia, West Ethiopia: a retrospective cross-sectional study. J Int Med Res 2024;52(1):1-10. doi: 10.1177/03000605231223038.
32. Grupy krwi. Honorowe krwiodawstwo i krwiolecznictwo. 2025. https://krwiodawcy.org/grupy-krwi (23.07.2025).
33. Stany magazynowe danej grupy krwi pełnej w poszczególnych centrach krwiodawstwa. Portal Honorowych Dawców Krwi. 2025. https://krew.info/zapasy/ (23.07.2025).
34. Stany krwi. Regionalne Centrum Krwiodawstwa i Krwiolecznictwa w Krakowie. 2025. https://rckik.krakow.pl/ (23.07.2025).
35. Monitoring zapasów krwi. Regionalne Centrum Krwiodawstwa i Krwiolecznictwa w Katowicach. 2025. https://rckik-katowice.pl/ (23.07.2025).
36. Częstotliwość występowania grup krwi w Polsce. Portal Honorowych Dawców Krwi. 2025. https://krwiodawcy.org/statystyki/grupy-krwi.html (23.07.2025).
37. Blood safety and availability. Geneva: World Health Organization; 2025. https://www.who.int/news-room/fact-sheets/detail/blood-safety-and-availability? (23.07.2025).
38. Trojanowski A, Dziedzic U. Zabezpieczenie Polski w krew i jej składniki – duże potrzeby, zbyt mało dawców. Kontrola Państwowa 2024;5:38-53. doi: 10.53122/ISSN.0452-5027/2024.1.30.
39. Chien J, Yao C, Chen H, Ho TF. Trends in blood transfusion and causes of blood wastage: a retrospective analysis in a teaching hospital. BMC Health Serv Res 2025;25:67. doi: 10.1186/s12913-024-12170-x.
40. Gdzie pobierano krew pełną (w procentach %). Portal Honorowych Dawców Krwi. 2025. https://krwiodawcy.org/statystyki/gdzie-pobierano-krew-pe%C5%82na-w-procentach.html (23.07.2025).
41. Gasparovic Babic S, Krsek A, Baticic L. Voluntary Blood Donation in Modern Healthcare: Trends, Challenges, and Opportunities. Epidemiologia 2024;5:770-84. doi: 10.3390/epidemiologia5040052.
42. Stock B, Möckel L. Characterization of blood donors and non-blood donors in Germany using an online survey. Health Technol 2021;11,595-602. doi: 10.1007/s12553-021-00532-y.
43. Greffin K, Schmidt S, Schönborn L, Muehlan H. "Blood for Blood"? Personal Motives and Deterrents for Blood Donation in the German Population. Int J Environ Res Public Health 2021;16;18(8):4238. doi: 10.3390/ijerph18084238.
44. Kocic N, Bujandric N, Budakov Obradovic Z, Grujic J, Bezanovic M, Kolarovic J. Factors influencing blood donation among university students in Vojvodina, Serbia: cross-sectional study. BMJ Open 2024;14:e086700. doi: 10.1136/bmjopen-2024-086700.
45. Renaux O, Bouazzi L, Sanchez A, Hottois J, Martin M-C, Chrusciel J, et al. Impact of promoting blood donation in general practice: Prospective study among blood donors in France. Front Public Health 2022;10:1080096. doi: 10.3389/fpubh.2022.1080096.
46. Graf C, Oteng-Attakora K, Ferguson E, Vassallo R, Merz EM. Biomedical Excellence for Safer Transfusion Collaborative. Blood Donor Incentives across 63 Countries: The BEST Collaborative Study. Transfus Med Rev 2024;38(2):150809. doi: 10.1016/j.tmrv.2023.150809.
47. Bots M, de Grouw EPLM, van Rooyen-Schreurs IHM, van den Akker GJ, Sturk A, Klinkspoor JH, et. al. Strategies to reduce wastage of red blood cell units. Vox Sang 2016;110:143-9. doi: 10.1111/vox.12351.
48. Yazer M.H, Abraham S, Beckman N, Folléa G. International Society for Blood Transfusion international survey on blood product wastage in hospitals. VOXS 2016;11:24-31. doi: 10.1111/voxs.12236.
49. Goczyńska P, Mikołowska A, Antoniewicz-Papis J, Bojarska E, Budzyński Ł, Frączek-Chudzik N, et al. Management of wastage of blood and blood components in Polish Blood Establishments 2005–2022 – a pilot study. Acta Haematol Polonica 2025;56(1):65-72. doi: 10.5603/ahp.102448.