



DEPT. OF ANESTHESIOLOGY AND INTENSIVE THERAPY

Head of Department: Zoltán Ruszkai, MD, PhD

Tel: 00-36-28-507 600/228

Fax: 00-36-28-507-611

E-mail: ito@florhosp.hu

Transfusion Practices in Intensive Care Units: a Hungarian Nationwide Survey

STUDY PROTOCOL WITH SAP

Approval Number: BM/8863-3/2025

Last updated on June 4, 2025





Introduction

Blood transfusion, as a life-saving therapeutic intervention, is an essential part of patient care. However, like any therapeutic procedure, transfusion carries potential risks and complications; therefore, its indication must always be carefully considered. The decreasing number of blood donors and inadequate blood utilization represent an increasing global problem by limiting access to blood products, while the costs of producing and storing blood products place a significant burden on healthcare budgets.

According to data from the Hungarian Central Statistical Office, in 2022 a total of 541,402 units of blood products were used in Hungary for patient care and transfusion purposes.

In a recently published international prospective cohort study involving 223 intensive care units, transfusion rates were found to be high among critically ill patients during the study period (2019–2022). Twenty-five percent of patients received at least one unit of red blood cell transfusion (median: 2 units/patient) during their ICU stay.

This is not surprising, as beyond bleeding complications and overt or occult hemorrhage, critically ill patients have numerous additional risk factors for anemia. The most common include myelosuppression associated with critical illness, chronic iron deficiency, renal failure, and iatrogenic blood loss related to invasive diagnostic and therapeutic procedures as well as laboratory testing.

Based on results from previous randomized controlled trials, current recommendations and guidelines favor a restrictive transfusion strategy (indicated below hemoglobin levels of 7–8 g/dL) over a liberal approach (9 g/dL) in critically ill patients.

It is important to emphasize that the goal of red blood cell transfusion is not solely to normalize hemoglobin levels, but to ensure adequate tissue oxygenation by optimizing oxygen transport capacity. Given the significant heterogeneity of ICU patient populations, individual assessment is essential in all cases. Therefore, a single laboratory parameter—hemoglobin concentration—is insufficient to determine transfusion indication and required dose. In other words, not only the degree of anemia but its consequences determine the need for transfusion.

Assessment should include clinical signs (e.g., general weakness, dizziness, tachycardia, circulatory failure, dyspnea, failed weaning, etc.) and physiological parameters reflecting impaired tissue oxygenation and oxygen deficit/debt (e.g., serum lactate, central venous oxygen saturation, arterio-venous carbon dioxide difference, arterio-venous oxygen content difference).

Patient Blood Management (PBM) focuses on the triad of anemia, blood loss, and transfusion, emphasizing opportunities to modify these factors. Implementation of PBM programs and dedicated outpatient clinics has improved patient safety and reduced blood utilization in many countries. Although Hungary has introduced a National Blood Donation and Blood Saving Program and professional guidelines for managing life-threatening perioperative bleeding, these mainly focus on high-volume bleeding and hemostasis correction. PBM, however, extends beyond this and is also highly relevant in ICU care, even in non-bleeding patients.





The aim of the present questionnaire-based survey is to assess daily transfusion practices in Hungarian ICUs. To our knowledge, no similar survey has previously been conducted in Hungary.

Study Location

Flór Ferenc Hospital, Kistarcsa

Department of Anesthesiology and Intensive Care

2143 Kistarcsa Semmelweis tér 1.

Investigators

Dr. Zoltán Ruzskai, PhD – Head of Department, Study Director

Dr. Csanád Geréd – Senior Physician, Investigator

Dr. Angéla Mikó – Senior Physician, Transfusion Responsible, Investigator

Dr. Dorottya Csillag – Resident, Co-investigator

Aim of the Study

The aim is to assess transfusion practices in the management of anemic critically ill patients in Hungarian ICUs using an online questionnaire consisting of 15 mandatory and 1 optional question. The study evaluates the use and frequency of physiological transfusion triggers (e.g., serum lactate, ScvO₂, CO₂ gap, oxygen content difference) and the implementation of PBM programs.

The results may contribute to improving transfusion practices, enhancing patient safety, improving outcomes, and promoting rational blood use.

Study Type

Non-interventional, cross-sectional observational survey study.





Participants

Physicians working in Hungarian ICUs

Planned number: minimum 100 respondents

Participation is voluntary and anonymous.

Inclusion Criteria

Registered anesthesiology and intensive care residents, trainees, and specialists working in Hungary.

Exclusion Criteria

Anesthesiologists and intensive care practitioners working in non-Hungarian intensive care units.

Funding

No special equipment or financial resources required.

Methods

A descriptive online questionnaire (Google Forms) in Hungarian. No personal or sensitive data are collected. Institutional names are recorded only for geographical analysis. Data collection period: July 1 – September 30, 2025.

Information for Respondents

Dear Colleague,

Transfusion is essential but carries risks. Current evidence supports restrictive strategies. However, Hungarian data on ICU transfusion practices are limited, which is why this survey is conducted.

The questionnaire takes approximately 10–15 minutes. Participation is voluntary and anonymous.





Contact: ruszkai.zoltan@florhosp.hu

Questionnaire Structure (Summary)

- Type of institution
- Institution and department name
- Years of professional experience
- ICU profile
- Number of ICU beds
- Annual patient volume
- Use of PBM protocol
- Presence of PBM clinic
- Local transfusion protocol
- Transfusion practices (1 vs 2 units)
- Clinical indications
- Hemoglobin thresholds
- Physiological triggers (e.g., lactate, ScvO₂, CO₂ gap)
- Target hemoglobin and physiological values

Endpoints

Primary endpoint:

Use of physiological parameters in transfusion decision-making.

Secondary endpoints:

- Restrictive vs liberal transfusion strategy
- PBM implementation
- Relationship between PBM and transfusion triggers
- Presence of local protocols

Statistical Analysis Plan

Data analyzed using MedCalc software. Results expressed as percentages with 95% confidence intervals. Normality tested with Kolmogorov–Smirnov test. Group comparisons via chi-square test, correlations via Pearson method, and PBM effects via two-way RM ANOVA. Significance: $p < 0.05$.





Publication Policy

Results will be published in Q1/Q2 journals and presented at conferences. Data will be handled confidentially in compliance with Hungarian data protection laws. No personally identifiable data will be disclosed.

Kistarcsa, June 4, 2025

Zoltán Ruskai, MD, PhD
Study Director

