

## Hematocrit isn't Targeted Indicators for Hemotransfusion

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### Opinion

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### Abstract

This article was focused on the ways to interpret changes of hematocrit (Ht) and its role in a complex system of condition assessment of the organism. Ht data and therefore hemoglobin (Hb) not only does not objectively reflect the severity of the patient with blood loss, but also a priori are not targeted indicators for hemotransfusion. Objective analysis of Ht and Hb levels should be carried out only in connection with data on blood pressure, pulse rate, respiratory rate, diuresis, shock index and water balance. Recommendations for hemotransfusion, which are based only on the data of Ht and Hb are not justified and unsafe for the patient.

**Keywords:** Hematocrit; Hemoglobin; Assessment System; Blood Loss; Hemotransfusion

**Abbreviations:** Ht: Hematocrit; Hb: Hemoglobin; CBV: Circulating Blood Volume

### Introduction

In modern health care today, blood transfusion plays a vital role. Blood transfusion can alleviate health and save life if used appropriately. According to WHO, appropriate use of blood products is defined as “the transfusion of safe blood products only to treat a condition leading to significant morbidity or mortality that cannot be prevented or managed effectively by other means” [1]. The accumulation of fundamental knowledge in the field of Hematology, Immunohematology, Pathophysiology, Biochemistry, Biophysics, Histology and other related

medical specialties objectively contributed to the formation of a new medical discipline – Clinical Transfusiology. Unfortunately, today among some anesthesiologists and resuscitators there is an erroneous and potentially dangerous point of view regarding the importance of this discipline. Inertia of traditional views on blood loss, archaism of fundamental knowledge in the field of Clinical Transfusiology negatively affects the quality of writing clinical protocols of blood transfusion. The presence of a large number of incorrect scientific articles in various peer-reviewed surgical journals (including journals with a high citation rating) forms a false idea among doctors about the pathophysiological mechanisms of blood loss, an adequate assessment of severity of the clinical condition of the patient.

Such publications deprive the understanding of the mechanisms of compensatory systems of the organism, which resist massive blood loss and protect the body from death. The intensive care doctors and anesthesiologists should be aware that from the point of view of pathophysiology, to maintain the compensatory reactions of the organism, primarily, the therapy must be directed at the elimination of acute deficit circulating blood volume (CBV), secondly, correction of coagulation factors, and only in the last instance – to a possible increase in the number of the oxygen-carrier [2]. The severity of the patient's condition in acute massive blood loss does not depend directly on the indicators Ht and Hb. The severity of the patient's condition determines the individual ability of the organism to resist hypoxia, the effectiveness of compensatory systems [3]. In this aspect, the development and improvement of personalized express-diagnostic systems of functional state of the organism, estimation algorithms of the patient's severity are one of

the main vector of the objective approach to solving the issue of timeliness and effectiveness the prescribing of hemotransfusion. For example, today one of the alternative variants of such evaluation system can be the author's universal analytical system of physiological condition of the body (PHUAS) [4]. The main task of therapy of acute massive blood loss is not urgent thoughtless application of blood transfusion for the fast recovery of the levels of Ht and Hb, and the timely establishment of adequate conditions for maintaining functioning of compensatory systems of the organism and providing of the sanogenetic processes.

The main purpose of this article is to teach of doctors to interpret correctly the different of variants of the hematocrit changes as part of a integrated system of assessing the state of the organism. Parameters of the body.

Variants	Ht	Pulse rate	BP	Diuresis	Respiration rate	Shock index
I	↓	↑	Normal	Normal	Normal/↑underload	↑
II	↓	Norma/↓	↑	Normal/↓	Normal/↑	↓
III	↓	↑↑	↓↓	↓↓/Anuria	↑↑	↑↑↑
IV	↑	Normal/↑	Normal/↑	↑/↓	Normal/↑	Normal/↑

Notes: BP - blood pressure; Shock index = Pulse rate/ systolic blood pressure (N=0.54).

Table 1: The variants of changes in hematocrit on the background of the reaction of the basic physiological.

## Discussion

**Variant I:** The level of hematocrit decreased against the background of moderate tachycardia and tachypnea, which increase after physical activity. Blood pressure and hourly urine output are normal. The shock index is moderately elevated. This variant of hematocrit reduction characterizes *hemic hypoxia* and in the absence of dynamics of hemoglobin reduction appointment of hemotransfusion is not advisable.

**Variant II:** The level of hematocrit decreased against the background of normal or slight decrease in heart rate. Blood pressure's up. Urine output is reduced or normal. The shock index is always below normal (<0.54). This variant characterizes the state of *hypovolemia*. At the same time, the implementation of hemotransfusion in order to increase the level of hematocrit is not only unjustified, but also dangerous for the patient's life due to the volume overload of the small circle blood circulation.

**Variant III:** The level of hematocrit decreased against the background of severe tachycardia and tachypnea, lower blood pressure and hourly diuresis, to the manifestation of anuria. Elevated shock index (>1.5). This variant to reduce the level of hematocrit is in a mixed form of hypoxia (circulatory + hemic hypoxia), which is characteristic of *massive blood loss*.

**Variant IV:** The level of hematocrit increased against the background of normal or increased pulse rate, blood pressure and diuresis. At the same time, the dynamics of hematocrit increase may be accompanied by a decrease in hourly diuresis. Shock index is up. This variant of hematocrit level change is typical for *hypovolemic polycythemia*.

## Conclusions

Thus, hematocrit data and therefore hemoglobin not only does not objectively reflect the severity of the patient

with blood loss, but also a priori are not targeted indicators for hemotransfusion. Objective analysis of Ht and Hb levels should be carried out only in connection with data on blood pressure, pulse rate, respiratory rate, diuresis, shock index and water balance. Recommendations for hemotransfusion, which are based only on the data of Ht and Hb are not justified and unsafe for the patient.

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