

Prescribing duration of blood transfusion in prevention of TACO: Guideline in norm of transfusion

Prescribing duration blood transfusion

A bag or unit of blood is supposed to increase hemoglobin 1g/dL. The volume of blood in vessels is related to the weight of the patient (Volemia is 70 to 80ml per kg of weight) so the effect of a unit of blood is different with the weight of patient (From 0.7 g/dL in a 90 Kg man up to 1.4g/dL in a 50 kg woman). The transfusion of one unit of blood may make a quick increase of volemia. For example the volume of blood in vessels is about 3 et 5L in adult. So the transfusion of one unit of blood (about 300mL) increases from 5 to 10% the blood mass.¹ So a patient with 6g/dL of hemoglobin should receive 3 units of blood to reach 9g/dL. But if this is a norm in acute hemorrhage when there is a loss of volume, it is quite different in chronic anemia.

In chronic anemia the volume of red cells is low but the total blood volume in vessels is normal. So the transfusion of a bag makes an increase of volume. This increase of volume can increase the (BP) Blood Pressure if water cannot be eliminated by kidneys. It can increase the pressure in cardio-pulmonary circulation and makes a cardio pulmonary overload (TACO) if there is a myocardial or a heart valve impairment.

Except in acute hemorrhage, flow of transfusion is 10 to 15 mL/min in adult, in infant the flow is lower (5mL/kg/h, 150mL/h). In adult with renal or cardiac impairment or in newborn the rate should be about 2ml/kg/h, I.E. a duration 1h45 for a 70 kg patient, 2h in a 50kg patient. However the duration of transfusion of a unit cannot exceed 3h. After each unit transfused the status of patient should be assessed. And it is highly recommended to transfuse only one unit and the second one has to be postponed to next day.¹

Prescription for risk patient

Following the Guide of good practice in drugs prescriptions, the doctor has to prescribe the way of administration the posology and either the duration or the flow and the rhythm of administration.²⁻⁵

Way of administration

The way of administration for transfusion is of course IV. It could be either with volumetric pump or dripping mode.⁶

Posology

Posology for any drug is most often in milligrams or milliliters per kilogram of weight. This is not for blood products.

Particularity for blood products

Except in newborns, the unit for blood products is a bag of blood or unit of blood. This unit is not of constant volume but it varies with the weight of donor, it is not possible to modify the content.

It is not conceivable to discard some blood (if the unit is too big) except for pediatric units.

The choice regarding the volume is not possible because of the blood group and phenotype.

Volume 8 Issue 3 - 2020

Jean Ginot

ARS cellule hémovigilance, France

Correspondence: Jean Ginot, ARS cellule hémovigilance, France, Email Jean.ginot@wanadoo.fr

Received: February 17, 2020 | **Published:** June 25, 2020

Following the guidelines, in patients with cardiac or renal impairment, youths or elderly with chronic anemia it is highly recommended to transfuse one bag or unit per day.¹

Duration of administration

When it is impossible to change the quantity of blood of a unit, it is necessary to change the duration or flow of administration. So the doctor has to prescribe the duration of blood transfusion. But to assure the microbiological safety the maximum time of transfusion is 2 hours.

However as it has been previously seen, in its study ANSM (Agence Nationale Sécurité Médicament) reports that it is possible to increase the time up to 3hours, particularly in patients with cardiac or renal impairment, newborn or elderly to prevent TACO.¹

So it appears to be reasonable to assess the patient and prescribe the appropriate flow of transfusion. (9)

For that purpose to make the prescription safer and easier we propose 3 procedures.

1-normal

2-long, up to 2hours

3- In Elderly, newborn cardiac or renal impairment up to 3hours.

In each of these procedures the flow should be notified noted. If given mL/min or mL/h, this should be a good way to the use of volumetric pump (Table 1).⁶

Assessment of patient

Patients could be categorized on a scale of 1 to 5 similar to the ASA classification (Table 2): (7) (8)

Prescribing a blood transfusion (in countries where blood transfusion is performed by nurses)

Prescribing a blood transfusion requires indeed to prescribe the blood products (either Red cells, Platelets (Plt) or Fresh Frozen Plasmas (FFP)). But not only!

Prescribing the act of transfusion

Nowadays, doctors have to prescribe the transfusion so that the nurse in charge of transfusion is aware that she has to plan a transfusion in her work time. This is more important since hospitals have (CPF) Computerized Patient File. The CPF is dissociated from the paper form used to order the blood products.

This will prevent nurses to forget the blood transfusion and avoid risk of deletion of the blood at expiration (validity)-time. (Computerized blood products prescription is not routine. This will be different when computerized blood products prescription will be current.).

Table 1 Dose administration.

	Procedures		
	1 Normal	2 Long (up to 2hours)	3 up to 3hours
For a blood bag of about 350 ml	Testing dose 50 ml: rate 30 drops/min (1ml=20 drops) 1.5 ml /min So it needs 33 min for 50 ml The rest of the bag 300 ml Should be transfused in 30min IE 10 ml/min =600ml/h	Testing dose 30 ml: rate 30 drops/min (1ml=20 drops) 1.5 ml /min So it needs 20 min for 30 ml The rest of the bag 320 ml Should be transfused in 100min IE 3.2 ml/min =192 ml/h	1.94≈2 ml/min 120ml/h At that rate it is not necessary to do a testing dose

Table 2 ASA Classification

Current definitions and ASA-Approved Examples		
ASA PS Classification	Definition	Adult Examples, Including, but not Limited to:
ASA I	A normal healthy patient	Healthy, non-smoking, no or minimal alcohol use
ASA II	A patient with mild systemic disease	Mild diseases only without substantive functional limitations. Examples include (but not limited to): current smoker, social alcohol drinker, pregnancy, obesity (30 < BMI < 40), well-controlled DM/HTN, mild lung disease
ASA III	A patient with severe systemic disease	Substantive functional limitations; One or more moderate to severe diseases. Examples include (but not limited to): poorly controlled DM or HTN, COPD, morbid obesity (BMI ≥40), active hepatitis, alcohol dependence or abuse, implanted pacemaker, moderate reduction of ejection fraction, ESRD undergoing regularly scheduled dialysis, premature infant PCA < 60 weeks, history (>3 months) of MI, CVA, TIA, or CAD/stents.
ASA IV	A patient with severe systemic disease that is a constant threat to life	Examples include (but not limited to): recent (< 3 months) MI, CVA, TIA, or CAD/stents, ongoing cardiac ischemia or severe valve dysfunction, severe reduction of ejection fraction, sepsis, DIC, ARD or ESRD not undergoing regularly scheduled dialysis
ASA V	A moribund patient who is not expected to survive without the operation	Examples include (but not limited to): ruptured abdominal/thoracic aneurysm, massive trauma, intracranial bleed with mass effect, ischemic bowel in the face of significant cardiac pathology or multiple organ/system dysfunction

Patients ASA I or 2: procedure 1

Patients ASA 3: procedure 2

Patients ASA 3 or 4: procedure 3

Patients ASA 5: procedure 3 or no transfusion

So doctor has to prescribe.

The blood products to blood bank.

The act of transfusion in CPF to let the nurse know that she has to do a transfusion.

Number of units.

The duration or the flow of blood transfusion or the appropriate procedure 1, 2 or 3.

Conclusion

It is important that doctors prescribe the duration or the flow of blood transfusion (in mL/min mL/h) or drops/min or the appropriate procedure 1, 2 or 3 to status of patient

Acknowledgments

None.

Conflicts of interest

The author reports no conflicts of interest in this work.

References

- 1 ANSM Acute edema of post transfusion overload. Report September 2013.
- 2 Article R.5132-3 of the public health code prescriptions and prescriptions modified by decree n °2013-1216 of December 23, 2013 relating to the recognition of medical prescriptions established in another Member State of the European Union.
- 3 Omé DIT Observatory for Medicines, Medical Devices and Therapeutic Innovations 2009 Guide «Good Prescription Drug Practices in the Center Region» Good Drug Prescription Practices (hospitalized, outgoing or seen in an outpatient)
- 4 HAS 5 B rule The HAS «5 B» rule applied to infusion To administer by infusion, the mnemonic means of «5 B» can be completed in «10 B «
- 5 Order of April 6, 2011 relating to the management of the quality of medication and medication in healthcare establishments.
- 6 Ginot J. Blood transfusion with volumetric infusion pump. *Hematol Transfus Int J.* 2018;6(4):141–142.
- 7 ASA Physical Status Classification System.
- 8 French Society of Anesthesia and Resuscitation ASA Score.
- 9 Canadian Blood Services: Guide to Transfusion Practice: Chapter 9. Administration of blood and blood products table 3.