

Chapter 16: Preoperative Autologous Donation

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BACKGROUND

This chapter focuses on preoperative autologous donation (PAD). There are other types of autologous blood use (e.g. acute normovolemic hemodilution and intraoperative and postoperative blood salvage) which are not discussed in this chapter.

PAD refers to the donation of blood by a patient for his/her own future use; generally this is for a scheduled elective surgery. The top three procedures associated with a request for a PAD are total hip replacement, total knee replacement and hysterectomy.

In most cases, allogeneic blood transfusions are a safe and available option. Autologous and directed donations should be confined to circumstances of rare blood types or plasma protein deficiencies in which allogeneic units may not meet patient needs. Rare blood types represent only a small number of autologous units collected each year. See Chapter 13 of this [Guide](#) for more information on directed donations.

BENEFITS AND RISKS OF PAD

Only a few high-quality randomized controlled trials studying PAD have been published, leaving the overall risks and benefits of PAD controversial. The primary benefit of PAD may be confined to circumstances of rare blood cell antigen types or unusual plasma protein deficiencies in which allogeneic units may not meet patient needs. The Krever Commission recommended in 1997 that PAD be made available to patients¹, but the historical benefits of autologous donation are no longer clear when the residual risk estimates of a potentially infectious allogeneic donation in Canada are very low (1 in 21.4 million donations for HIV, 1 in 12.6 million donations for HCV and 1 in 7.5 million donations for HBV)².

In terms of risk, PAD has been associated with an overall 30% increased likelihood of transfusion (autologous plus allogeneic) and may increase the risk of perioperative anemia. Information about the additional need for allogeneic blood in those patients who were transfused with autologous blood has not been reported in Canada.

The majority (80%) of the autologous collections are not transfused to the patient.³ The appropriateness of transfused autologous units has not been studied in Canada. Units collected as PAD cannot be moved to the allogeneic inventory as PAD donors/patients do not necessarily meet the criteria for allogeneic donation.

DECLINING USE OF PAD

The use of autologous collections has decreased significantly across Canada, from over 5,000 annual PAD collections in 2007 to less than 200 in 2015.³ There has also been a decline in hospital-based PAD collection; only two sites registered for PAD with Health Canada in 2017.

The reasons for the observed decrease in autologous blood component collection and use include advances in surgical techniques, patient blood management (PBM) programs and a decreasing risk of transfusion transmitted infections with allogeneic blood. PBM is defined as “the timely application of evidence-based medical and surgical concepts designed to maintain haemoglobin concentration, optimise haemostasis and minimise blood loss in an effort to improve patient outcome”.⁴ Widespread use of PBM principles has resulted in an overall decrease in transfusion rates in several countries including Canada.⁵ For example, Canadian Blood Services distributed approximately 27 red blood cell units per 1,000 population in the 2016–2017 fiscal year, representing a steady decrease since 2009–2010 (32 units per 1,000 population).

<https://professionaleducation.blood.ca/en/transfusion/guide-clinique/preoperative-autologous-donation>

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The declining use of PAD in Canada suggests a need to re-evaluate the scope of a PAD program in Canada.

ELIGIBILITY FOR AUTOLOGOUS DONATION

The description below applies to autologous donations collected by blood operators in Canada (i.e. Canadian Blood Services or Héma-Québec). Hospital-based collection sites may have different processes for determining eligibility.

Physicians and surgeons refer potential autologous donors to the relevant blood operator. The request goes through an internal review process to determine if the patient meets the donor criteria. The final decision to proceed with the autologous donation is at the discretion of the medical director of the blood operator.

Blood cannot be collected from a patient within 72 hours of the operation. Informed consent of the patient/donor must be obtained in writing prior to initiating the donation series.

There are no age limits for autologous donors. The minimum weight requirement for autologous donors is 50 kg (110 lbs). Before the first donation, donors must have a minimum hemoglobin of 110 g/l and a minimum hematocrit of 33%. At subsequent donations, the minimum hemoglobin required is 105 g/l with a minimum hematocrit of 32%. The majority of autologous donors donate one or two donations.³ A maximum of four donations can be collected from the donor/patient. The donations are normally drawn one week apart. Initiation of iron therapy to return the hemoglobin to the pre-donation level is advised, but this is often not done; only 8% of donors were found to be on iron therapy.³

INDICATIONS AND CONTRAINDICATIONS

PAD is most beneficial in procedures with substantial anticipated blood loss such as vascular and cardiothoracic surgery. Autologous collection should be considered only if the chance of requiring a transfusion exceeds 10%. Patients with low-risk surgeries that rarely require blood should not be considered for a PAD. The autologous donation process can result in donor complications at a rate as high as 12 times greater than with healthy volunteers.⁶ This is related to differences in the eligibility criteria for the autologous donation process.

Absolute contraindications for autologous donation include:

<ul style="list-style-type: none">• idiopathic hypertrophic sub-aortic stenosis• aortic stenosis• left main coronary artery disease• unstable angina• cardiac failure	<ul style="list-style-type: none">• myocardial infarction within six weeks of a donation date• atrioventricular block• evidence of infection or risk of bacteremia, such as indwelling urinary catheter
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MANUFACTURING AND TESTING OF AUTOLOGOUS PRODUCTS

Whole blood is collected in citrate-phosphate-dextrose (CPD) anticoagulant and processed into red blood cell units. Plasma is available only upon special request prior to donation. Autologous whole blood is not available.

Red blood cell units are plasma reduced by centrifugation, platelet reduced by either centrifugation or filtration and leukoreduced by filtration. The red blood cell unit is resuspended in saline-adenine-glucose-mannitol (SAGM) additive. This preservative solution allows the red blood cell units to be stored for up to 42 days with the appropriate storage conditions (the same as for allogeneic red blood cells).

Each autologous unit for every donor is tested for the same transfusion transmitted infection (TTI) markers as

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for allogeneic collections (see Chapter 6 of this [Guide](#)). Any unit testing confirmatory positive for infectious markers other than syphilis will be destroyed and the donor deferred from continuing the autologous collections. Units testing confirmatory positive for syphilis are still safe for autologous use, but are labelled as biohazardous for regulatory reasons. Units that have false positive or indeterminate TTI testing results are acceptable for use.

PRODUCT SAFETY AND POTENTIAL ADVERSE EFFECTS

The transfusion of an autologous blood product is not risk-free. PAD units should only be transfused if clinically indicated. Complications such as receiving the wrong unit, bacterial contamination and transfusion-associated circulatory overload may occur as readily with autologous units as with allogeneic units.

CONTINUING PROFESSIONAL DEVELOPMENT CREDITS

Fellows and health-care professionals who participate in the Canadian Royal College's Maintenance of Certification (MOC) Program can claim the reading of the Clinical Guide to Transfusion as a continuing professional development (CPD) activity under Section 2: Self-learning credit. The reading of one chapter is equivalent to **two credits**.

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We're here to answer your questions about the Clinical Guide to Transfusion. We'd also appreciate your ideas on how to improve the Guide. Please contact us through the [Clinical Guide feedback form](#).

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