



## THE PERFUSIONIST'S ACTIVITIES IN SAFE CARDIOVASCULAR SURGERY

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### ABSTRACT

**Objective:** to report the experience as perfusionist in cardiovascular surgeries with emphasis on patient safety in the cardiopulmonary bypass. **Methods:** descriptive study of the type of experience report about cardiopulmonary bypass during cardiovascular surgeries in a university hospital located in the south of Brazil from July 2015 to July 2018. **Results:** cardiopulmonary bypass comprises a set of techniques and use of materials and equipment for the temporary replacement of the patient's cardiopulmonary functions during the main period of cardiovascular surgery. The professional performing this activity must have adequate training, because during the conduction of cardiopulmonary bypass, it is necessary to maintain the patient's acid-base, hydroelectrolytic and hemodynamic balance. **Conclusion:** cardiopulmonary bypass is a specialty in which nurses can act as long as they have the qualification to perform such function in order to guarantee the safety of the patient during its accomplishment.

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## INTRODUCTION

With the technical-scientific development in the area of health, the surgical interventions have become more complex. Among the high complexity surgeries are the cardiovascular ones. One of the specificities of this type of surgery is the need for cardiopulmonary bypass (CPB) during the intraoperative period. Brazilian institutions with high cardiovascular complexity in Brazil total 236 care units and 47 referral centers that perform cardiovascular surgery in the country (Ministério da Saúde, 2016). The multiprofessional team in surgical environment involved in cardiovascular surgery is formed by cardiovascular surgeons, anesthesiologist, perfusionist and nursing. It should be noted that the improvement of cardiovascular surgery is based on the progress of (CPB), and should be performed by a qualified professional. The cardiac perfusion consists of a professional qualification, which is recognized by the federal councils of: nursing, biomedicine, physiotherapy, pharmacy and biology. The professional daily life of the perfusionist is of high responsibility, as among his duties is to temporarily replace the patient's cardiopulmonary functions through the CPB (Souza and Elias, 2006).

The CPB can be considered as a high risk procedure, and it is the responsibility of the perfusionist to ensure patient safety during cardiac perfusion. Although the devices currently used in CPB are of superior quality, the skilled person is not dispensed to perform this vital function to guarantee patient safety (Barbosa *et al*, 2010). Regarding safe surgery, the World Health Organization (WHO) advises the use of a check list before the onset of anesthesia, before starting the surgery and after the end of the surgical procedure (before the patient leaves the operating room) recommending adaptation of the same according to the reality experienced (Agência Nacional de Vigilância Sanitária, 2009). The use of check list in the CPB in the intraoperative period of cardiovascular surgeries is considered a useful tool for the prevention of interferences (Nicoletti, 2018). In this sense, the performance of the perfusionist nurse in synergy with the surgical team in favor of safe cardiovascular surgery becomes essential to obtain favorable results.

## MATERIALS AND METHODS

It is an experience report as a perfusionist in cardiovascular surgeries with emphasis on patient safety in CPB, in a public hospital located in the south of Brazil from July 2015 to July 2018.

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## RESULTS AND DISCUSSION

**The Perfusionist:** The cardiac perfusion or CPB is a growing area, but little known among nursing professionals. It consists of a professional qualification, which is recognized by the federal councils of: nursing, biomedicine, physiotherapy, pharmacy and biology, being supervised by their respective councils and supported by the Brazilian Society of Extracorporeal Circulation (SBCEC, 2017) with the objective of maintaining qualified assistance in the performance of this function. According to SBCEC, the perfusionist is a professional who is registered by the CBO (Brazilian Classification of Occupations) of the MTE (Ministry of Labor and Employment) under No. 2235-70, with its attributions and basic training to exercise this occupation that must have higher education in the areas of biological sciences or health (SBCEC, 2016). The daily routine of the perfusionist is of high responsibility, since among his duties is to temporarily replace the cardiopulmonary functions of the patient through CPB, using specific materials and equipment in the main period of cardiovascular surgery. In addition, macro and micro hemodynamic control, stable hydroelectrolytic, hematologic and acid-base balance must be maintained. In this context, the perfusionist performs a fundamental role in the safety of cardiopulmonary surgery procedures with CPB, not only for its direct action with specific perfusion materials and equipment, but also for the prevention of incidents (Adachi; Momose, 2009).

### Safe cardiopulmonary bypass

Although there is a constant improvement in perfusion equipment and techniques, it is believed that the primary factor for safety in cardiac perfusion will remain the professional's knowledge (Palanzo, 2007). The current technological scenario generates dependence on machines and systems and requires constant adaptation by the professional. The occurrence of unexpected events in these media is considered a high stress factor due to the dependence of the technology for the development of the work (Brito; Rodrigues, 2011). With regard to the principles adopted in surgical centers, due to the complexity of cardiovascular surgery, techniques for quality improvement in this area are compared to those used in high technology industries, such as aviation. One example is the motor failure of an extracorporeal circulation pump during cardiac surgery, compared to failure of an airplane engine in the middle of the Atlantic Ocean. There are solutions, but quality can be compromised. It is also recommended that any incident be thoroughly investigated as a preventive measure (Murad; Murad, 2007). It is believed that CPB incidents with circuit components are avoided through careful review during assembly, and should be examined for sterility, integrity, and validity. It can be considered that the knowledge of the structure and functioning mechanisms of the oxygenators and other devices used, the close and careful observation, the continuous monitoring of the patient's parameters and the attention to the detail, has shown, in practice, to be the best recipe to prevent accidents and prevent complications (Almeida *et al*, 2011). Regarding the multiprofessional interaction, it is possible to emphasize the interaction between surgeons and perfusionists as essential regarding high level safety in cardiovascular surgery. In this aspect, the inclusion of the perfusionist cannot be underestimated, since it plays a fundamental role in the safety of procedures that require the use of CPB. Not only for its

direct action with specific materials and infusion equipment, but also for the prevention of accidents and the reduction of complications that may occur (Adachi; Momose, 2009). The use of previously established resources, such as the development of care protocols as tools for the audit process, the use of a safety check list (AmSect, 2013) and good communication among the surgical team, are considered of extreme importance for the promotion of perfusion safety. The use of these measures contributes significantly to the reduction of accidents and complications during CPB (Croti *et al*, 2011). Broadening this reflection, it is possible to consider perfusion safety, not only as an isolated element in cardiovascular surgery, but as a series of interconnected factors that includes equipment, safety devices, adequate management of CPB, surgical technique, observation and communication within the operating room (Brito; Rodrigues, 2011). The perfusionist should implement safety precautions such as pre-procedure review. The use of check list aims to direct the management of CPB according to the patient, type of surgery and presence of comorbidities. In this context, it should be noted that the WHO Safe Surveillance Checklist was based on scientific evidence, however, it is possible to adapt it according to the reality experienced, as long as it remains its "essence" in terms of common sense by the team with a view to patient safety (Nicoletti, 2018). The items of the routinely used cardiopulmonary bypass check list (Nicoletti, 2018) are described in Table 1.

**Table 1. Items of the safety check list on extracorporeal circulation. Santa Maria / RS, 2018**

Patient identification data	Name, surgical proposal, laboratory and imaging exams, comorbidities, reserve of blood components, weight and height;
Equipments	Oxygen and compressed air regulating valves, mains, emergency devices, gas mixer, CPB machine operation (rollers, circulation pump of choice, water pump) and holders for coupling disposable material;
Materials	Sterility, validity and integrity of the packaging of the devices that make up the CPB assembly;
Surgery Planning	Discussion of the case with the multidisciplinary team;
Circuit preparation	According to surgery, revision of the connections, integrity, pump calibration and rollers and cardioplegic solution;
Prime	Solution for the completion of the CPB circuit, according to the surgical proposal and patient;
Anticoagulation	According to the weight of the patient, the activated coagulation time should be monitored;
Macro monitoring and patient micro-hemodynamics	Mean arterial pressure, arterial and venous blood;
Temperature	Review of cooling and heating via heat exchanger.

The check list directed to CPB can be considered as a complement to safe cardiovascular surgery and requires the attention of the perfusionist. It is necessary to incorporate it into the routine of the professional making it a habit, since it can be considered a potential barrier to prevent the occurrence of incidents with irreversible damage to the patient during the surgical procedure.

### Conclusion

Safe surgery has become a requirement in all specialties, acquiring space and credibility due to the fact of providing

safety for surgical procedures with the objective of reducing the mortality rates in the intraoperative period. In this premise, cardiovascular surgery because it is considered a surgical procedure of high complexity, should be treated as such, and it is necessary to include all the professionals who work in this specialty in the context of safe surgery. Therefore, due to the vital function performed by the professional who performs cardiac perfusion, it is essential to use revision tools such as the check list before and during cardiopulmonary bypass for patient safety.

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