

This increase in cardiac surgery within the region poses additional clinical challenges that are related to the use of blood products, such as adding to the burden of already limited blood bank resources, the high cost of blood product screening, and the risks of transfusion-related diseases and potential bleeding complications. In this region, the issue of short preoperative periods for patient optimization compounds the problem. “The challenge was in finding ways not to just increase supply but also to minimize the utilization of blood products,” explained Ronald Henry, MD, The Doctors Inn Research Group, Trinidad and Tobago.

In an effort to resolve the mounting problem of blood product scarcity and overutilization of resources, Dr. Henry and colleagues developed strategic initiatives that were evaluated at the Port-of-Spain General Hospital. The first initiative focused on preoperative preparation, including holding aspirin or Plavix prior to surgery to minimize blood loss, securing the appropriate number of blood units, and implementing a standard protocol to optimize hemoglobin (Hb) levels prior to surgery, with a target Hb of >15.0 g/dL (Table 1).

Table 1. Protocol to Optimize Hb Levels Prior to Cardiac Surgery (Target Hb >15.0 g/dL).

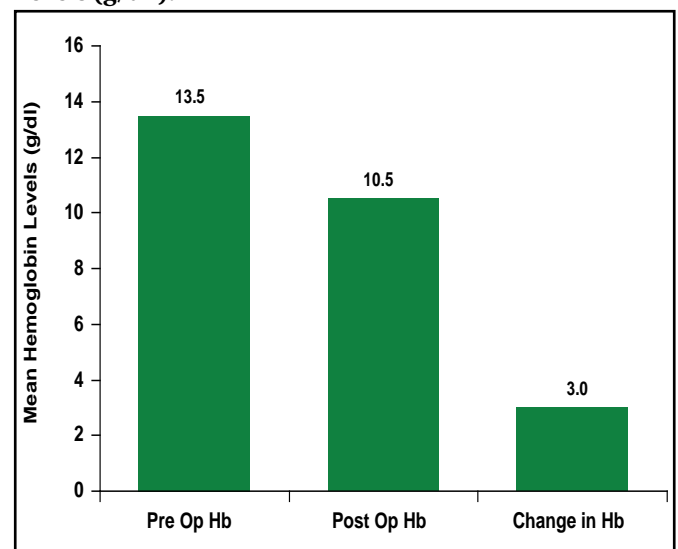
Hb Level (g/dL)	Recommended Therapy
<11.0	Intravenous iron sucrose (Venofer®) plus erythropoietin
11-13	Oral ferrous sulfate plus erythropoietin
13-15	Oral ferrous sulfate alone

Another strategy that Dr. Henry and colleagues employed in this program involved hospital laboratory cooperation. Hospital laboratories were asked to consistently provide proper and dedicated refrigeration facilities to allow for a protocol-based return of unused blood, and crossmatching of blood products was part of a pooled analysis that involved multiple potential recipients. Intraoperative management approaches included the use of “Cell Saver” devices, which allow for the reinfusion of blood at the end of the operative process, limiting unnecessary waste, and the prophylactic use of intravenous tranexamic acid to reduce postoperative bleeding. Postoperative protocols were also employed that consisted of stringent indications for transfusion and restriction of utilization to essential candidates.

From September 2006 to November 2009, a total of 227 cardiac surgery procedures (the majority of which was bypass or valve procedures) were evaluated. There were 5 deaths, and the in-hospital mortality rate was 2.2%. Almost all patients who underwent cardiac surgery

required preoperative iron therapy, but postoperative Hb ranges were favorable, with 40% of patients in the >11 g/dL range (Figure 1). Thirty-six percent of patients received 200-300 mL of blood that was returned to them due to cell saver therapy, which negated the need for transfusion in this cohort. Most importantly, this study marks the first time that blood was ever returned to the blood bank, despite the previous protocols that were in place, concluded Dr. Henry.

Figure 1. Preoperative and Postoperative Mean Hb Levels (g/dL).



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This evaluation demonstrated the benefit of preoperative optimization of hemoglobin in patients who were undergoing cardiac surgery in a region where blood product resources are a concern. The use of “cell saver” approaches may also reduce the need for transfusion in many patients, thus lowering transfusion-related complication rates. Collaboration with blood banks and specific protocols, as seen in this study, may also optimize blood product utilization. The development of standardized protocols to manage this medical need is necessary in order to reduce the burden that is associated with blood product scarcity in this and other regions that are faced with this same clinical challenge.

The Expanded Use of Device Therapy for SCA in Trinidad and Tobago

Device therapy in Trinidad and Tobago is complicated by regional limitations and inadequate resources. However, sudden cardiac arrest (SCA) events are generally

associated with poor survival rates, even in the setting of cutting-edge early defibrillation programs, because most SCA events are not witnessed and treatment is not initiated within the crucial 8-minute response window. Lana Boodhoo, MD, Eastbourne General Hospital, Eastbourne, UK, discussed the challenges and approaches to improve the success rate of device therapy in this population.

Cost, infrastructure, equipment, and personnel limitations pose barriers to implantable cardioverter defibrillator (ICD) treatment in Trinidad and Tobago. There is no state funding for these devices, which are quite costly, averaging \$15,000 to \$25,000 in this region. There are three centers in the region that possess implantation capabilities, only one of which is a public institution, and there are no coronary care units within the public sector. Availability of these devices is also a problem, as they generally require preordering, which lengthens the time to implantation, and equipment for lead extraction is scarce. Skilled personnel with specialized knowledge of devices are also in short supply.

Recent initiatives to raise awareness and expand availability within Trinidad and Tobago include industry-sponsored ICD training courses for physicians and technical staff, the development of ICD support groups for physicians and patients, and a sudden cardiac death audit and education program (launch pending). These initiatives have contributed to a rapid increase in ICD implantation procedures between 2008 and 2009, most of which were provided within the public sector through organization such as Heartbeat International.

The average age of the patients at the time of ICD implantation (n=20) was 55 years (65% was male), the mean left ventricular ejection fraction was 35%, and 50% of patients had NYHA class III. At 1 year, device therapy was successful in 10% of patients. The mortality rate at 1 year was 10%. These preliminary outcome data are consistent with those seen in ICD recipients in other populations.

Though device therapy has expanded in Trinidad and Tobago, there remains a treatment gap in this region, and eligible patients are still being overlooked. This discrepancy may be due to cost, poor SCA survival outcomes, a lack of awareness, cultural perceptions (ie, cardiac death being seen as merciful), and the absence of a national cardiology framework. The implementation of specific eligibility guidelines and a national cardiac services plan, while fostering ICD awareness and investment that is related to ICD infrastructure, personnel, and equipment, will allow for successful ICD implantation in Trinidad and Tobago on a broader scale in the future.

Surgical Treatment of Tetralogy of Fallot in the Dominican Republic

Significant progress has been made in the area of congenital cardiac surgery in the Caribbean. In 1999, the Dominican Heart Program was established with the development of a congenital cardiac surgery unit within the Centro de Diagnóstico y de Medicina Avanzada y de Conferencias Médicas y Telemedicina (CEDIMAT) in Santo Domingo, Dominican Republic. Freddy Madera, MD, described recent successes and challenges that have been involved with the surgical treatment of tetralogy of Fallot (TOF) at CEDIMAT, based on the review of retrospective case series (n=44 patients). TOF accounts for ~10% of cardiac congenital abnormalities and performance of corrective procedures for TOF are rapidly increasing in the Dominican Republic.

Dr. Madera and colleagues evaluated postoperative outcomes, risk factors, surgical techniques, and treatment approaches, based on TOF cases at CEDIMAT between January 2007 and April 2009. Most of the study population (70%) was quite ill with moderate to severe TOF. Forty-eight percent of patients were aged 6 to 10 years. Preoperatively, patients tended to have poor oxygen saturation levels (52% had <75% oxygen saturation) and a history of hypoxic crisis (59%). Preoperative hemoglobin levels were >18 g/dL in 52% of patients (n=23). Transesophageal echocardiogram (TEE) was performed on each patient pre- and postoperatively.

The surgical techniques that were utilized were total correction (84% of patients), conduit (11.5%), and Blalock-Taussig (BT) shunt (4.5%). Transannular patch was necessary in 45% of the cases, and cardiopulmonary bypass was utilized for >2 hours in 51% of the cases. Postoperative complications included right ventricular diastolic dysfunction in 30% (n=12), pleural effusion in 18% (n=7), severe bleeding in 8% (n=3), and dysrhythmia in 5% (n=2). Three patients (8%) required reintervention (1 due to patch dehiscence and 2 due to BT shunt obstruction). Postsurgical TEE revealed residual ventricular septal defect in 19% of patients, pulmonary insufficiency in 12% of patients, and right ventricular pressure of >50% in 7% of patients. Patients with these echocardiographic findings did not have clinical or hemodynamic repercussion and did not require additional interventions.

None of the patients who underwent total repair died perioperatively. Overall, perioperative and long-term mortality rates were quite low. One patient who received a BT shunt died within 30 days of treatment. However, this