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

may be reflective of the patient's complex anatomy and the severity of disease. One death was reported >30 days postsurgical treatment. Total repair of TOF at CEDIMAT was associated with low morbidity and mortality rates, and it appears to be a reasonable therapeutic strategy for TOF. More follow-up is needed to establish long-term treatment outcomes and to determine the risk that is associated with complications, such as right ventricular dilatation and severe rhythm disturbances. Findings from this review are promising and demonstrate that TOF strategies that are currently being utilized in the Dominican Republic confer low mortality risk.

CRT and Optimizing Cardiac Function with Echocardiography

Cardiac resynchronization therapy (CRT) devices are often used to treat heart failure and cardiac dysrhythmias. Leads that are placed in the cardiac muscle create electrical pulses that stimulate coordinated contractions within the atrium, right ventricle, and left ventricle, which fosters optimal diastolic filling and systolic contraction. Optimization of CRT devices enriches cardiac health, as demonstrated by improved ejection fraction and NYHA functional class, as well as extended distance that is covered during the 6-minute hall walk. John R. Dylewski, MD, FACC, South Miami Heart Center, Miami, Florida, USA, discussed various ways of optimizing CRT devices and how to make the most of imaging modalities, such as echocardiography.

Atrioventricular (AV) delay may be optimized using 2-dimensional echocardiography to evaluate mitral regurgitation and septal wall motion. Ideally, AV delay should be the shortest possible to allow for maximal ventricular filling while reducing mitral regurgitation and increasing left ventricular function. However, if AV delay is too short, E/A wave diastasis may ensue, resulting in almost no atrial kick. The atrium contracts too late; so, the AV delay should be increased. Conversely, E/A wave fusion occurs when the AV delay is too long. Thus, an excess of atrial kick with little or no E wave occurs, and truncation of A wave may occur by premature closure of the mitral valve. AV optimization results in improved diastolic function.

Echo-driven V-V optimization improves systolic function and is also vital to the management of CRT devices. Using the parasternal long axis view of M-Mode echocardiographic imaging, the timing between septal and posterior wall contractions should be coordinated. When the ventricles are synchronized, V-V optimization has been achieved.

Optimal delays do change over time. Therefore, it is important to check timing, recalibrate rhythm, and ensure optimization regularly. Timing is everything, and cardiac rhythm synchronization can greatly influence the burden of disease.

Additional ECG Leads May Not Provide Benefit in Detecting Brugada Syndrome

In a preliminary study, the use of additional electrocardiogram (ECG) leads was no more sensitive than standard 12-lead ECG assessment in detecting the signature ECG pattern of Brugada Syndrome (BrS), including right bundle branch block (RBBB), persistent ST-segment elevation in precordial leads V1 to V3, and normal QT interval.

BrS is a rare genetic disorder that increases the risk of sudden cardiac death (SCD). Diagnosis requires the detection of Type 1 ST-segment elevation, either spontaneously present or induced by a challenge with a class I antiarrhythmic (eg, ajmaline, flecainide). Traditional 12-lead ECG has a low sensitivity for Type 1 Brugada ECGs and may not detect the presence of this life-threatening syndrome. New research is focused on improving the detection of BrS with novel ECG lead placement.

Multichannel continuous ECG recording in the third intercostal space has been shown to be more sensitive for the diagnosis of Type 1 Brugada ECG than either repeated 12-lead ECGs or multichannel continuous ECG in the standard position [Shimeno K. *J Cardiovasc Electrophysiol*. 2009]. In the current study, Raymond Massay, BSc (Hons), MBBS, FRCP (Lon), University of the West Indies, Cave Hill, Barbados, and colleagues compared standard 12-lead placement with ECG using multiple leads that were positioned to view the right ventricular outflow tract (RVOT) in the detection of BrS.

The trial enrolled 15 patients from a private cardiology practice in Barbados. All patients had a history of syncope, a family history of SCD, and previously documented Brugada-type ECG findings. Neither ajmaline nor flecainide were unavailable as a challenge agent. Instead, patients were given procainamide 10 mg/kg IV over 10 minutes. Both standard ECG and ECG using the additional leads were recorded during drug administration and for 5 minutes thereafter.

Dr. Massay found no Brugada ECG patterns by either conventional or additional lead placement. Procainamide was well tolerated, with no arrhythmias, hypotension, or allergic reactions reported. A larger trial of patients who are