post-discharge (75% female, median age 52.5 years). Patients themselves estimated their partner’s care burden by completing the DOBI at the same 3 time points. Differences in scores were tested by analysis of variance and paired t-tests when appropriate.

**Results:** Prevalence of depressive symptoms in partners of LVAD patients is high at discharge (75% shows signs of severe depression). This improves in time but remains significant (58% at 1 month and 33% at 3 months).

Partners very frequently provide practical and emotional support at all time points, yet do not perceive providing support as burdensome. No significant decrease in frequency and perceived burden of providing different types of support can be observed over time.

Patients significantly underestimate the practical (p=0.011), motivational (p<0.0001) and emotional support (p=0.030) provided during hospitalization, and continue to underestimate the practical support provided by their partners post-discharge. Correlations between the partners’ and patients’ perception of caregiver burden are in general weak and non-significant.

**Conclusion:** The high rate of depressive symptomatology in partners of LVAD patients both before and after discharge is worrisome. Although partners seem not to perceive providing support as burdensome, the extent of support provided is high. These innovative insights should encourage LVAD teams to consider emotional and practical support strategies for caregivers.

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**Improving Bone Health in Children Supported on Ventricular Assist Devices**

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**Purpose:** Children supported with ventricular assist devices (VAD) may be at increased risk for fractures as a result of immobility, nutritional insufficiencies and medication effects. We sought to describe the incidence of fractures in children with VADs and report our multidisciplinary approach to improved bone health.

**Methods:** We retrospectively reviewed all children who underwent VAD implantation from 2005-14. Demographic data was collected. Bone fractures were identified during VAD support and up to 1-year post transplant.

**Results:** Over 10 years, 40 children (26 female), aged 6.7±6.0 (median 4.6, 0.02 to 17.5 yrs) underwent implantation of 43 VADs (7 HeartWare, 25 Berlin Heart, 4 Rotaflow, 7 Abiomed BVS 5000). Diagnosis included; cardiomyopathy (27) and congenital heart disease (13). During a total of 2471 days of VAD support (median 26.5, range 1 to 342 days), 2 patients had fractures, and an additional 3 patients had 5 separate long bone fractures within the first year post transplant. Of the 5 patients who had fractures, 4 were non-weight bearing, all were on loop diuretics >3 mos and had received > 3 mos of unfractionated or low molecular weight heparin.

One patient was transitioned from heparin to fondaparinux, a synthetic factor Xa inhibitor as an alternate anticoagulant to prevent bone absorption inherent to other heparins. She received a total of 60 days of heparin, 88 days of enoxaparin, and 23 days of fondaparinux, and was successfully transplanted, with no increase in clotting events after transition to fondaparinux. Dedicated assessment of bone health was instituted for all VAD recipients with focus on high risk patients; infants and toddlers, non weight bearing, all were on loop diuretics and anticoagulation use following transition to fondaparinux, and was successfully transplanted, with no increase in clotting events after transition to fondaparinux.

**Conclusion:** Fractures occurred in 12.5% of children supported with VADs, attributable to poor bone health. It is imperative that programs address bone health and modifiable risks as part of comprehensive VAD and post transplant care.

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**Risk Assessment for HeartWare HVAD Support as a Bridge to Transplant: Is the HeartMate II Risk Score Applicable?**

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**Purpose:** The HeartMate II Risk Score (HMRS) was devised to predict 90-day mortality in patients undergoing Heartmate II support. The purpose of this study was to examine the accuracy of the HMRS in patients receiving the HeartWare HVAD as a bridge to transplant (BTT).

**Methods:** Patients receiving an HVAD as part of the BTT clinical trial and continuous access protocol (n = 382) comprised the cohort. The HMRS was calculated using preoperative serum creatinine, albumin, INR, and patient age. Institutional HVAD volume was assumed to be >15 for trial duration.

Patients were divided into risk groups according to published HMRS thresholds: low (<1.58), medium (1.58 - 2.48), and high (>2.48) risk. The area under the receiver operating characteristic curve (AUC-ROC) was used to assess HMRS accuracy. Kaplan-Meier survival estimates were calculated and log rank testing was used for survival comparisons across risk score groups.

**Results:** The median patient age was 56 years, creatinine 1.21 mg/dL, albumin 3.5 g/dL, and INR 1.2. The sample median HMRS was 1.31. The HMRS classified 63% (n=240) as low risk, 26% (n=99) as medium risk, and 10% (n=40) as high risk for death at 90 days after VAD. Overall sample survival was 90% and 84% at 6 and 12 months respectively. There was no overall significant difference in HVAD patient survival based on HMRS group (Figure 1, p=0.12). HVAD discrimination for 90 day survival was poor (AUC-ROC|95% CI| = 0.56(0.445-0.682)).

**Conclusion:** In this cohort of BTT HVAD recipients, the HMRS failed to provide accurate risk stratification. Future study is needed to determine if risk models devised in VAD model-specific cohorts apply to all patients on continuous flow support.

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**Predictors of Late Survival Following Continuous-Flow Left Ventricular Assist Devices**


**Purpose:** To describe the early, mid and long-term survival of the largest single-center series of patients with new-generation, totally implantable continuous-flow left ventricular assist device (CF LVADs).

**Methods:** A retrospective review of all patients (N=469) implanted with a CF LVAD at a single center between December 1999 and December 2013. Demographics, pre-operative and operative data, perioperative outcomes, echocardiographic and right heart catheterization data, and late survival were gathered. Univariate, survival, and multivariable analyses were performed.

**Results:** Patient characteristics, baseline echo and hemodynamic data, operative characteristics and clinical outcomes are summarized in Figure 1A. Patients were mainly bridge-to-transplant (BTT), with elevated creatinine, multiple comorbidities, critical INTERMACS class 1 or 2, and low advanced pulmonary vascular resistance (PVR) and pulmonary capillary wedge pressures (PCWP). Mean follow-up was 2.1±2.4 years (maximum 13.3 years). Survival is illustrated in Figure 1B (entire cohort) and stratified by INTERMACS class.
by era (Figure 1C). Multivariable regression identified PVR (OR 1.12, 95% CI 1.02-1.23, p=0.02), aortic insufficiency (OR 1.43, 95% CI 1.02-2.06, p=0.04) and concomitant procedures (OR 1.67, 95% CI 1.01-2.77, p=0.046) to predict worse survival. Larger left ventricular cavity size was protective (OR 0.73, 95% CI 0.57-0.92, p=0.01).

**Conclusion:** This is the largest experience of CF LVADs, along with long term survival data, at a single center. The patient profile is markedly higher risk than published multi-centre INTERMACS Registry. Early survival has improved in recent era and is similar to INTERMACS Registry. Late survival is encouraging. Aortic insufficiency and concomitant procedures increase mortality. Elevated PVR and small LV cavity size should be avoided.

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**Characteristics and Outcomes in Patients Receiving Mechanical Circulatory Support With a History of Diabetes**

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**Purpose:** This study compares patients receiving durable mechanical circulatory support (MCS) with severe diabetes (sDB) to those without sDB.

**Methods:** INTERMACS participants enrolled between 5/2012 and 3/2014 were stratified by sDB status. Pre-implant demographics, clinical characteristics, and laboratory values and post-implant adverse event rates were compared. Patient outcomes were analyzed using Kaplan-Meier survival analysis, competing outcomes, and risk adjusted parametric hazard modeling.

**Results:** Of the 4672 patients analyzed, 435 (9.3%) had sDB (as diagnosed by the treating hospital). Patients with sDB were more likely to be older, white, INTERMACS Level 3 (stable but not inotrope dependent), have additional comorbidities, and be destination therapy. Patients with sDB were less likely to be listed for transplant. The unadjusted three month survival was 90% for both patients with or without sDB. But after three months, patients with sDB had a worsening survival (see figure, p=0.04). After adjusting for known risk factors for MCS mortality, the early hazard ratio [HR(95%CI)] for sDB patients compared to those without sDB was 0.8 (0.6, 1.1) and the late HR was 2.4 (1.4, 4.1). When simultaneously considering the outcomes death, transplant, and recovery, the one year estimated outcomes for sDB patients are 64.3% alive on a device, 23.8% death on a device, 11.2% transplant, and 0.7% ventricular recovery; while the one year estimates for patients without sDB are 63.6% alive on a device, 18.4% death on the device, 17.4% transplant, and 0.7% ventricular recovery (p=0.002).

**Conclusion:** MCS patients with and without sDB have similar early survival, but over time the sDB patients experience a comparatively worse survival. At one year, sDB patients are more likely to die on the device and less likely to receive a transplant. This may be due to sDB patients having other comorbidities. These findings should be taken into account when sDB are considered for destination therapy.

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**Gender Differences in Mechanical Circulatory Support - Insights From a European Registry**

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**Purpose:** Mechanical circulatory support (MCS) is an established treatment option for patients with end-stage heart failure. Although there are numerous reports identifying sex-specific differences with respect to progression and prognosis of heart failure, little is known about gender differences in indication and outcome for patients with ventricular assist devices (VAD).

**Methods:** Between January 2011 and June 2014, a total of 1066 consecutive VAD patients were submitted to the EUROMACS registry. Demographic data, underlying cardiac diseases, and outcomes were analyzed for gender differences.

**Results:** In this European cohort, 168 (16.7%) patients were female and 838 (83.3%) patients were male (p<0.001). ECMO was less frequent in female patients (41, 24.4%) than in male patients (372, 44.4%; p<0.001). At the time of VAD implantation, female patients were younger than male patients (48±17yrs vs. 52±12yrs, p<0.001). Women presented in a more critical state (41.5%); p<0.001). ICM was less frequent in female patients (27%, 9.3%; p<0.001). Temporary or permanent RV support was necessary in 43 (25.6%) women and thus significantly more frequent (21, 12.5%) than in men (78, 9.3%; p<0.001). ECMO bridging was more often used in women (41, 24.4%) than in male patients (372, 44.4%; p<0.001).

**Conclusion:** Women, who already have an inferior life expectancy when diagnosed with end-stage heart failure, are likely to be transferred in a later and more critical clinical state for VAD implantation. They show a higher incidence of perioperative RV failure and worse long-term survival. We urge that referral strategies and implant timing be revised for female patients to improve their MCS outcome.

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**Inclusion of Cognitive and Mood Domains in the Assessment of Frailty Enhances Outcome Prediction in Patients Undergoing Ventricular Assist Device Implantation**

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