the higher volume comparator. Thus, synchronized diastolic injection may be an appealing alternative for TAVI procedures.

**CATEGORIES OTHER:** Pre-Clinical/First In-Human Studies

### TCT-447

**Severity Assessment of Transcatheter Aortic Valve Paravalvular Regurgitation Based on the Leakage Momentum Flux**

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**BACKGROUND** The current semi-quantitative method of assessment paravalvular regurgitation (PVR) in transcatheter aortic valve (TAV) is the circumferential extent (CE) of PVR. This study points out to the shortcomings of such assessment method. In addition, a novel approach based on fluid mechanics is proposed to evaluate TAV PVR. The proposed method is based on the estimation of the maximum momentum flux of the leakage flow, Jmax, from the parameters that are conventionally measured for aortic regurgitation (AR) evaluation: CE of PVR, central jet velocity/width, and the aortic/ventricular pressures.

**METHODS** 26 mm SAPIEN 3 devices were implanted within 3D printed custom-build silicone washers to create different levels of PVR in an in-vitro pulse-duplicator system. Regurgitation volumes were measured at different pressure conditions representative of hypotensive, normotensive, and hypertensive conditions based on ISO-5840. The aforementioned parameters for AR evaluation were obtained using Doppler echocardiography.

**RESULTS** The results demonstrated a considerable inaccuracy in assessment of TAV PVR severity via CE of PVR. In addition, the results showed a nearly linear correlation between Jmax, and RV, indicating the capability of Jmax in PVR assessment in TAVs.

**CONCLUSION** The results show correlation relation between Jmax and regurgitation volume. The new approach in assessment of the severity of PVR based on estimation of Jmax showed a significant improvement in terms of accuracy compared to the commonly used CE of PVR.

**CATEGORIES IMAGING:** Imaging: Non-Invasive

## HEMODYNAMIC SUPPORT AND HIGH RISK PCI

**Abstract nos: 448 - 452**

### TCT-448

**Impact of Clinical Indication / Risk Strata on Outcomes in Patients Supported with Impella Microaxial Heart Pumps**

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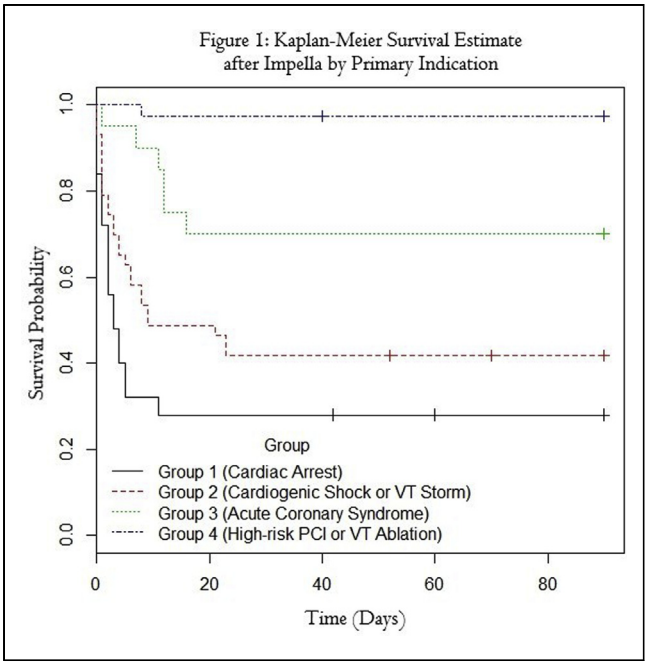
**BACKGROUND** As indications for mechanical circulatory support (MCS) with Impella have evolved, complications and mortality across indications remain incompletely understood.

**METHODS** A retrospective study of patients (pts) treated with Impella over a 10-year period at a single large medical center was conducted. EMR were reviewed for pertinent clinical and procedural data.

**RESULTS** 127 consecutive pts with Impella were analyzed and divided into risk strata based on acuity of primary MCS indication: Group 1 - cardiac arrest (n=25), Group 2 - cardiogenic shock (n=41) or VT storm (n=2), Group 3 - ACS (n=20), Group 4 - high-risk PCI (n=34) or VT ablation (n=5). Impella 2.5L devices were utilized more frequently than Impella CP in Groups 3 (100% vs 0%) and 4 (72% vs 29%) (p<0.001). 30-day mortality was 72%, 58%, 32%, and 2.6% in groups 1-4 respectively (p<0.0001) (Figure 1). Hemorrhage requiring transfusion occurred more frequently in higher acuity groups (32% in group 1, 23% in group 2, 15% in group 3, and 2.6% in group 4; p=0.006), with a trend toward more hemolysis (p=0.061) and limb ischemia (p=0.068) in higher acuity groups as well. In the total cohort, hemolysis (OR 6.8 [1.7-40.0]; p=0.003) and hemorrhage (OR 3.3 [1.2-9.9]; p=0.016) were univariate predictors of 30-day mortality, while limb ischemia (OR 3.2 (0.4-36.6); p=0.213) was not a significant predictor.




**CONCLUSION** Pts with high acuity indications for Impella had dramatically higher 30-day mortality and major complications. As indications for Impella use expand, future investigations should focus on optimization of risk and benefit in high-risk pt cohorts.

**CATEGORIES CORONARY:** Hemodynamic Support and Cardiogenic Shock

### TCT-449

**Trends in Utilization and Hospital Variation in the use of Mechanical Circulatory Support Devices in Patients Undergoing Percutaneous Coronary Intervention in Michigan: Insights from the Blue Cross Blue Shield of Michigan Cardiovascular Consortium (BMC2)**

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**BACKGROUND** The medical complexity of percutaneous coronary intervention (PCI) patients is increasing. Correspondingly, recent years have seen an increasing availability of mechanical circulatory support (MCS) devices. We sought to evaluate trends and variations in the use of such devices in Michigan.

**METHODS** We analyzed patient clinical demographics and comorbidities, trends in utilization, and hospital variations in the use of MCS devices in patients undergoing PCI in 48 hospitals in Michigan from January 2013 through September 2017. Patients were grouped as having undergone PCI with no MCS, an intra-aortic balloon pump (IABP), or an advanced MCS device. The BMC2-SCAI mortality risk model was used to calculate predicted risk of death as a measure of patient complexity. Cochrane Armitage test was used to assess for significance of temporal changes. Hierarchical generalized linear mixed effects regression was used to assess site variation in use of MCS accounting for baseline patient characteristics and comorbidities.