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Cost analysis of mechanical circulatory supported PCI in high-risk patients using veno-arterial ECMO compared to Impella: a single-centre experience

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THEME: Coronary Interventions
TOPIC(S): NSTEMI, Left main and multivessel disease

AIMS

Both Impella and Veno-Arterial extracorporeal membranous oxygenation(VA-ECMO) provide cardiac output support during high-risk PCI (HR-PCI).These devices have increased consumable costings but total episode-of-care expenditure reflect patient co-morbidities; resulting hospital length-of-stay(LOS); and also managing any device-related complications. This study compared the clinical and economic impact of mechanical circulatory support devices Impella and VA-ECMO for patients undergoing HR- PCI).

METHODS AND RESULTS

METHODS Consecutive non-shock patients treated with either Impella or VA-ECMO during semi-urgent HR-PCI from the Liverpool Cardiac Catheterisation and ICU databases(Jan 2010-Jan2019) were analysed retrospectively. Estimated total-admission cost was based upon published local Diagnosis-related group (DRG) guidelines to compare cost differences between these 2 treatment modalities, expressed in Australia [AUD] dollars. RESULTS 15 patients underwent HR-PCI with cardiac support;6 received VA-ECMO and 9 Impella. The up-front consumable cost of VA-ECMO is approximately AUD$13,646 vs $40,600 for Impella. VA-ECMO was associated with increased need for surgical vascular closure 100%vs11±33.3% in Impella(p=0.00002). Accounting for net Delta-1.3,at $12,790 per unit cost for Surgical DRG, this results in a net saving of $16,627 favouring Impella. VA-ECMO also associated with increased need for general anaesthesia 100%vs22±44% Impella(p=0.001)[cost $357 per unit multiplied by delta-0.78] resulting in $278.46 net saving for the Impella group. Impella compared to VA-ECMO, was associated with reduced total hospital LOS[11.9±9.2 vs25.8±9.4days];reduced coronary care unit (CCU)LOS [5.8±3.8vs10.5±3.9days(delta-4.7)]; reduced ICU-LOS[0.6±1.3 vs9.5±9.0 days(delta-8.9)(p=0.007)]; reduced ward bed LOS [3.5+4.8vs5+7.3(delta-1.4)] and reduced rehab bed LOS(delta-1.33). Application of cost per unit/per bed day in ICU and CCU [$5,830*delta =$52,146(ICU)+$27,531{CCU)]; ward-bed day($1,344*delta =$1,941) and rehab LOS ($316*delta= $421)]. Overall net benefit of reduced hospital LOS equated to savings of $81,197 favouring Impella. Access site complications(6vs3) and blood transfusion requirement(6vs3) were higher with VA-ECMO than Impella. Mean pRBC transfusion requirement was significantly reduced in the Impella arm 0.6±0.9unitsvs 5.5±2.6units ECMO(p=0.0003). Comparative cost analysis of total transfusion requirement of all blood products [pRBC transfusion $428/unit (multiplied by delta-4.9); platelet transfusion $294/unit(by delta-1.0); cryoprecipitate $165/unit(delta-5.0); FFP$186/unit(delta-2.2)] demonstrated net related savings of $3,638 in favour of Impella group. Encorporating larger up-front consumerable cost for Impella alongside incremental savings associated with care[reduced:LOS; blood transfusion; surgical closure and GA sedation] there was a total cost savings of AUD $74,786 per patient favouring Impella group over VA-ECMO.

CONCLUSIONS

VA-ECMO and Impella support for HR-PCI achieves excellent results. VA-ECMO appears significantly more resource intensive with higher access-site complication rates and extended hospital LOS. Impella in this early experience was

associated with significantly reduced ICU, CCU and total hospital length-of-stay and blood transfusion requirement. As such, Impella use amounts to substantial reduction in costs of care.