population being a possible explanation. Limitations of our study include—lack of proper validation studies of ICD codes for IE, lack of imaging data and lack of speciation of Staphylococcus.

In conclusion, Staphylococcus was the most common organism isolated in IE in the US and was associated with increased in-hospital mortality, length of stay, and cost of care. We also report an upward trend in Enterococcal IE during the study period – a finding that needs further study.

December 12, 2020

Declaration of Interests

The authors declare that they have no known competing financial interests or personal relations that could have appeared to influence the work reported in this study.

Muhammad Zia Khan, MD
Muhammad U Khan, MD
Moinuddin Syed, MD
Sudarshan Balla, MD, FACC*
West Virginia University, Morgantown, West Virginia
11 December 2020

1. Pant S, Patel NJ, Deshmukh A, Golwala H, Patel N, Badheka A. Trends in infective endocarditis incidence, microbiology, and valve replacement in the United States from 2000 to 2011. *J Am Coll Cardiol* 2015;65:2070–2076.
2. Databases H;Pages. Accessed at Agency for Healthcare Research and Quality, Rockville, MD. at www.hcup-us.ahrq.gov/databases.jsp.
3. Balla S, Alkhouli M. Infective endocarditis and outcomes of valve surgery: the bug, the valve, the host and the unknown. *J Thorac Dis* 2019;11:E178–EE81.
4. Wang A. Statement from the international collaboration on endocarditis on the current status of surgical outcome in infective endocarditis. *Ann Cardiothorac Surg* 2019;8:678–680.
5. McDonald JR, Olaison L, Anderson DJ, Hoen B, Miro JM, Eykyn S. Enterococcal endocarditis: 107 cases from the international collaboration on endocarditis merged database. *Am J Med* 2005;118:759–766.

https://doi.org/10.1016/j.amjcard.2020.12.055

Relation of Malnutrition to Outcome Following Orthotopic Heart Transplantation

There are approximately 2,200 orthotopic heart transplant (OHT) surgeries performed annually in the United States.[1] Most of the recipients are chronically ill with long-standing heart failure, and a prevalence of malnutrition ranging from 35% to 57%.[2] The decision surrounding candidacy is based on a careful assessment of risk (including malnutrition) and benefits, and in many cases, OHT may proceed despite underlying malnutrition. Data regarding the outcomes of patients with malnutrition receiving OHT are limited. We performed a retrospective cohort study using the Nationwide Inpatient Sample (2012 to 2015) to assess the impact of malnutrition on outcomes after OHT.

We used the International Classification of Diseases Ninth Edition Clinical Modification codes to identify all adult patients (age > 18) with and without malnutrition who underwent OHT. Data regarding baseline and demographic characteristics, as well as outcomes including in-hospital mortality, cost of hospitalization, length of stay, sepsis, and acute kidney injury were extracted. Weighted multivariate logistic regression was performed to assess the impact of malnutrition on OHT outcomes after adjusting for all baseline co-morbidities.

A total of 7,940 patients underwent OHT. Of those, 1,515 (19.1%) had malnutrition. Malnourished patients were more likely to be admitted to large urban teaching hospitals, belong to the lowest socio-economic quartile, have an underlying coagulopathy (51.8% vs 42.9%, $p < 0.01$) as well as fluid and electrolyte disorders (77.2% vs 64.4%, $p < 0.01$), but less likely to have hypertension, diabetes mellitus, dyslipidemia, chronic lung disease, and other co-morbidities. With regard to outcomes, patients with documented malnourishment had higher rates of in-hospital mortality (8.9% vs 5.3%, $p < 0.001$), sepsis (31.0% vs 13.5%, $p < 0.001$), acute kidney injury requiring dialysis (4.6% vs 3.6%, $p < 0.001$), and need for any form of mechanical circulatory support (MCS) (35.6% vs 18.4%, $p < 0.001$). They also had, on average, a two-fold longer length of stay and a 1.5-fold higher cost of hospitalization ($p < 0.01$). After adjusting for all baseline co-morbidities, malnutrition was an independent predictor of all-cause in-hospital mortality (odds ratio [OR]: 1.74, 95% confidence interval [CI]: 1.08 to 2.80, $p < 0.001$).

OHT is one of the most "high-stake" solid organ transplants and care providers do their best to optimize these patients for surgery and reduce their risk of adverse events postoperatively. However, there are limited trial data assessing the impact of malnutrition on OHT outcomes. This study found that patients with malnutrition had higher prevalence of co-morbid conditions such as fluid and electrolyte disorders, and coagulopathy, which could potentially be contributing to worse outcomes. We also found that the group with malnutrition had higher proportion of Africa-American (20.8% vs 18.4%, $p < 0.05$) patients, and those belonging to the lower income quartile (26.1% vs 21.5%, $p < 0.01$). These factors may represent a poor socio-economic support system, which is often an important consideration while deciding the candidacy for OHT. Malnourishment in advanced heart failure is frequent and may be multifactorial, secondary to an increased systemic inflammatory response, congestive gastropathy leading to a protein-losing enteropathy, and heightened levels of circulating catecholamines. Whether judicious use of mechanical circulatory assist devices to improve nutritional status and perioperative risk, beyond intense nutritional support and physical rehabilitation, can help improve outcomes and organ utilization remains an elusive question that needs to be answered in future studies.

Declaration of interests

The authors declare that they have no known competing financial interests or personal relations that could have appeared to influence the work reported in this study.

Vardhmaan Jain, MD[a]
Adham Karim, MD[b]
Agam Bansal, MD[a]
Kirtipal Bhatia, MD[c]
Ann Gage, MD[a]
Muhammad Siyab Panhwar, MD[d]
W.H. Wilson Tang, MD[a]
Ankur Kalra, MD, FACP, FACC, FSCAI[a]*
[a] Cleveland Clinic, Ohio
[b] University of Kentucky, Kentucky
[c] Icahn School of Medicine at Mount Sinai (Morningside), New York
[d] Tulane University, Louisiana
4 December 2020
17 December 2020

1. Aurora P, Edwards LB, Kucheryavaya AY, Christie JD, Dobbels F, Kirk R, Rahmel AO,

Stehlik J, Hertz MI. The Registry of the International Society for Heart and Lung Transplantation: thirteenth official pediatric lung and heart-lung transplantation report—2010. *J Heart Lung Transplant* 2010;29:1129–1141.
2. Sze S, Pellicori P, Kazmi S, Rigby A, Cleland JG, Wong K, Clark AL. Prevalence and prognostic significance of malnutrition using 3 scoring systems among outpatients with heart failure: a comparison with body mass index. *JACC: Heart Fail* 2018;6:476–486.

https://doi.org/10.1016/j.amjcard.2020.12.056

Meta-Analysis of Drug-Coated Balloons Versus Drug-Eluting Stents for Small Vessel De-Novo Coronary Artery Disease

Drug-coated balloons (DCB) are innovative tools for the management of coronary artery disease.[1] They have been recognized as an effective treatment strategy for treating both bare metal and drug-eluting stents (DES) restenosis (class 1A level of evidence).[1] Several randomized clinical trials (RCTs) assessed the safety and efficacy of DCB versus DES for the treatment of small vessel (defined as <3 mm in diameter) de-novo coronary artery disease (SV-dCAD).[2-5] Recently, data from PCCOLETO II (Drug-Coated Balloon Versus Drug-Eluting Stent for Small Coronary Vessel Disease) and long-term data from BASKET-SMALL 2 (Drug-Coated Balloons Versus Drug-Eluting Stents for Small Coronary Vessel Disease) have been published and refueled the interest in DCB as a possible alternative strategy to DES in managing SV-dCAD.[2,4] Therefore, we conducted a meta-analysis of RCTs to compare the clinical outcomes of DCB versus DES.

A comprehensive search of the electronic database was performed for RCTs comparing DCB versus DES in the treatment of SV-dCAD. The outcomes of interest included major adverse cardiovascular events (MACE), all-cause mortality, myocardial infarction (MI), and target vessel revascularization (TVR). Results were pooled using the random effect model. The relative risks (RR) with 95% confidence intervals (CI) are reported.

A total of 4 RCTs with 1,257 patients (DCB = 632, DES = 625) with a median duration of follow-up of 12 months and 49% females were included. There was no difference between DCB and DES in MACE (RR = 1.15, 95% CI 0.73 to 1.81, p = 0.55, I^2 = 23%), all-cause mortality (RR = 1.03, 95% CI 0.63 to

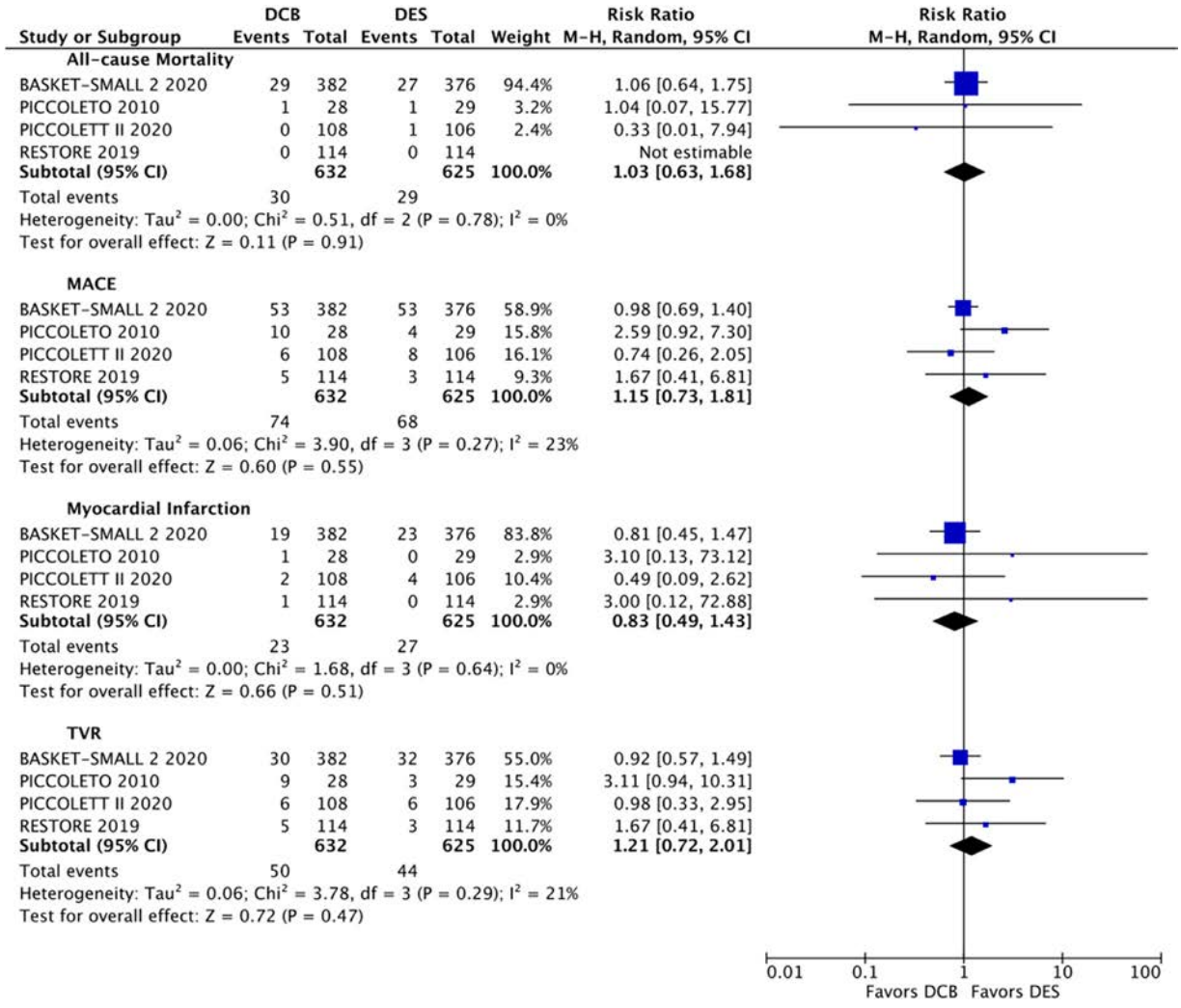

Figure 1. Forest plot for the outcomes.
DCB = drug-coated balloons; DES = drug-eluting stents; MACE = major adverse cardiovascular events, TVR = target vessel revascularization.