Frequency and Predictors of All-cause In-hospital Mortality in Transcatheter Mitral Valve Replacement: A Nationwide Inpatient Analysis, 2011-2015

Ahmed Mahmood, M.D., Ph.D[1]; Hasnan Ijaz, M.D[2]; Muhammad Uzair Lodhi, M.D[3]; Sohail Khan, M.D[4]; Thomas Alexander, M.D[1]

1- Division of Cardiology, Corpus Christi Medical Center, Texas ,2- Department of Internal Medicine, Westside Hospital, Florida,3- Department of Internal Medicine, Eastern Idaho Regional Medical Center, Idaho,4- American Heart and Vascular Instittue, Utah

CORPUS CHRISTI MEDICAL CENTER
An HCA Affiliated Hospital

Background

Large-scale studies reporting rates and predictors of all-cause mortality in patients undergoing transcatheter mitral valve replacement remain either limited or divergent.

Methods

Using weighted National Inpatient Sample (NIS) datasets from 2011-2015, we assessed frequency and predictors of all-cause inpatient mortality in patients undergoing TMVR. We also compared sociodemographic and healthcare resource utilization in TMVR-related admissions with in-hospital deaths as compared to admissions with survival to discharge.

Results

In 5,093 TMVR procedures from 2011-2015, all-cause in-hospital mortality was 2.5% (129/5093) **(Table 1A)**. The median age was comparable in TMVR cohorts with in-hospital death [75 (67-83) yrs] vs. survival to discharge [77 (67-84) yrs] (p=0.082). In comparison to the cohort with survival to discharge, patients who suffered in-hospital death were more often white (91.9% vs. 76.7%, p=0.002), admitted non-electively (34.9% vs. 25.7%, p=0.018) without any difference in sex distribution between the groups. On a multivariable analysis adjusted for baseline characteristics and comorbidities, independent predictors of higher post-TMVR in-hospital mortality in descending order were congestive heart failure (OR 7.05, 95% CI 3.45-14.40, p<0.001), fluid-electrolyte disorders (OR 5.64, 95% CI 3.66-8.69, p<0.001), diabetes with chronic complications (OR 3.72, 95% CI 1.68-8.23, p=0.001), renal failure (OR 2.00 95% CI 1.32-3.05, p=0.001), uncomplicated diabetes (OR 1.88; 95% CI 1.10-3.20, p=0.020) and coagulopathy (OR 1.78, 95% CI 1.13-2.79, p=0.013) **(Table 1B)**. Prior coronary artery bypass grafting (OR 0.34, 95% CI 0.16-0.69, p=0.003) predicted lower post-TMVR all-cause in-hospital mortality. Patients who were deceased following TMVR were found to have significantly higher length of stay [median (IQR); 11 (3-20) vs. 3 (2-8) days] and hospitalization charges [median (IQR); $278,899 (200,626-353,823) vs. $147,612 (106,645-220,940)] (p<0.001).

Table 1A. Baseline Characteristics of TMVR Population With Survival to Discharge vs. Inpatient Mortality

Variable	Survived to Discharge (N= 4964)	Deceased (N= 129)	Overall (N=5,093)	P
Age (years) at admission, median [IQR]	77 [67-84]	75 [67-83]	77 [67-84]	0.082
Male	56.4%	53.9%	56.4%	0.558
White	76.7%	91.9%	77.1%	0.002
Non-elective admission	25.7%	34.9%	25.9%	0.018
Urban-teaching hospital	87.9%	92.3%	88.0%	0.289
Length of stay, median [IQR]	3 [2-8]	11 [3-20]	4 [2-8]	<0.001
Hospital charges, median [IQR]	$147,612 [106,645-220,940]	$278,899 [200,626-353,823]	$149,952 [107,882-225,371]	<0.001

Table 1B. Multivariable Predictors of In-hospital Mortality in Patients Undergoing TMVR

Predictors	Adjusted OR	95% CI Lower Level	95% CI Upper Level	P
Age (years) at admission	0.99	0.97	1.00	0.131
Male vs. Female	0.97	0.64	1.48	0.897
Non-elective vs. Elective admission	0.97	0.63	1.50	0.906
Congestive heart failure	7.05	3.45	14.40	<0.001
Chronic pulmonary disease	0.88	0.55	1.41	0.597
Coagulopathy	1.78	1.13	2.79	0.013
Diabetes, uncomplicated	1.88	1.10	3.20	0.020
Diabetes with chronic complications	3.72	1.68	8.23	0.001
Hypertension	0.48	0.32	0.74	0.001
Fluid and electrolyte disorders	5.64	3.66	8.69	<0.001
Obesity	0.55	0.25	1.18	0.126
Peripheral vascular disorders	0.21	0.08	0.57	0.002
Renal failure	2.00	1.32	3.05	0.001
Dyslipidemia	0.94	0.61	1.43	0.761
Previous myocardial infarction	0.70	0.33	1.52	0.373
Previous coronary artery bypass grafting	0.34	0.16	0.69	0.003

P<0.05 indicates statistical significance. CI=confidence interval, TMVR= transcatheter mitral valve replacement, IQR= Interquartile range.
Note: Multivariable analysis was adjusted for Age in years at admission, Indicator of sex, Elective versus non-elective admission, Race, Alcohol abuse, Congestive heart failure, Chronic pulmonary disease, Coagulopathy, Diabetes, uncomplicated, Diabetes with chronic complications, Hypertension (combine uncomplicated and complicated), Fluid and electrolyte disorders, Other neurological disorders, Obesity, Peripheral vascular disorders, Renal failure, dyslipidemia, previous MI, Previous PCI, Previous CABG.

Conclusion

Using a nationally representative sample, we found 2.5% of post-TMVR all-cause in-hospital mortality rate
In conclusion, TMVR has shown to be a very safe procedure with a high success rate. However, In-hospital mortality due to procedural errors or independent predictors cannot be ignored. Interestingly, hypertension and peripheral vascular disorders showed lower mortality which is an important predictor for worse outcomes for many cardiovascular diseases. Based on our first national analysis further larger randomized controlled trials need to be conducted to further assess the safety and efficacy of TMVR and study predictors of mortality at further depth. Preventive strides to timely control comorbidities may help curtail inpatient mortality in high-risk patients following TMVR.

Contact Info

Twitter: @ahmedmahmoodmd
Email: Ahmed.Mahmood@hcahealthcare.com

HCA Healthcare®