Trends in Infective Endocarditis in End-stage Renal Disease Patients (From National Inpatient Sample [2006−2017])

Infective endocarditis (IE) is rising in incidence worldwide including US due to rise in aging population.[1,2] Patients with end-stage renal disease (ESRD) on long-term hemodialysis are at increased risk of developing IE.[3] This is thought to be due decrease immunity, uremia, and transient bacteremia due to repetitive vascular access through permanent arteriovenous fistulas, artificial grafts, and tunneled catheters.

Purpose of this study was to look at trends in outcomes and resource utilization of patients with IE and ESRD. We used the National Inpatient Sample (NIS) data from the year 2006 to 2017. The NIS is a large publicly available inpatient healthcare database designed to provide national estimates in the US.[4] International Classification of Diseases (ICD)-9 and ICD-10 codes were used to identify all hospitalizations. Pearson chi-square test and Mann Whitney U test was used for statistical testing. Multivariate logistic regression analysis was done for adjusted outcomes. For trend analysis, simple linear regression analysis was used. SPSS Statistics (IBM, v24.0) was used for all statistical analysis.

Of 5,22,547 weighted admissions, 82,269(15.7%) had ESRD. Patients with and without ESRD similar median age (60 years. [interquartile range (IQR), 50−70]) vs without ESRD (60 years. [IQR, 44 to 74]). Comorbid conditions like hypertension, diabetes, peripheral vascular disease and congestive heart failure were more common in ESRD population (Table 1). Patients with ESRD had higher adjusted mortality (Odds Ratio [OR], 1.777 [confidence interval (CI), 1.726 to 1.830]). ESRD patients were also less likely to have valvular surgery (OR, 0.761[CI, 0.735 to 0.787]). ESRD also had higher median cost of stay (21348 vs 25733) and length of stay (11 vs 9 days). Over the years we saw a decrease in mortality in both ESRD and non ESRD patients (Figure 1).

We noticed that ESRD is associated with much higher mortality as compared to non-ESRD patients. Higher mortality in ESRD could be combination of lower immunity, higher incidence of complications, resistant organisms that can contribute to higher incidence of sepsis and overall increase comorbid conditions.[5] We found that mortality is decreasing in both ESRD and non ESRD group probably due to better overall health care, though this improvement has plateaued since 2013. The rate of surgery was 8.7% in ESRD patients as compared to 12.2% for non ESRD patients. Although much lower than small cohort studies, the rate of surgery is similar to other national database studies like the danish data.[3] The lower rate of surgery in ESRD is likely due to patients being at prohibitive risk to surgery rather than IE not requiring surgery.[3]

Table 1
Baseline characters and out comes in patients of Infective Endocarditis with and without ESRD

	End stage renal disease		OR (95% CI)
Variable	No(n = 440,278)	Yes(n = 82,269)	Yes vs no
Age in years, Median (IQR)	60(44-74)	60(50-70)	0.988(0.987-0.989)
Female	175436(39.9%)	37285(45.3%)	1.186(1.162-1.21)
White	303897(76.6%)	32564(43.9%)	Reference
Black	43816(11.0%)	28167(38.0%)	4.825(4.71-4.943)
Hispanics	28894(7.3%)	8579(11.6%)	2.229(2.156-2.305)
Alcohol use	24984(5.8%)	1412(1.8%)	0.292(0.272-0.313)
Anemias	146025(34.0%)	42940(53.3%)	2.054(2.014-2.096)
Coagulopathy	86154(20.1%)	16689(20.7%)	1.102(1.073-1.131)
Congestive heart failure	76749(17.9%)	20026(24.8%)	1.174(1.145-1.203)
COPD	85015(19.8%)	14644(18.2%)	0.849(0.828-0.871)
Diabetes mellitus	105471(24.5%)	38132(47.3%)	3.452(3.362-3.544)
Hypertension	194307(45.2%)	68362(84.8%)	6.053(5.894-6.217)
Liver disease	40221(9.4%)	6266(7.8%)	0.902(0.869-0.937)
Obesity*	42277(9.8%)	9646(12.0%)	0.764(0.741-0.788)
Peripheral vascular disease	60663(14.1%)	14631(18.2%)	1.137(1.107-1.168)
weight loss	66729(15.5%)	13362(16.6%)	1.03(1.001-1.059)
Prior Prosthetic valve	30099(6.8%)	3246(3.9%)	0.613(0.585-0.641)
Prior Pacemaker	17887(4.1%)	2514(3.1%)	0.791(0.749-0.835)
Income 0-25th percentile	125846(29.3%)	30861(38.5%)	Reference
25th−50th	108731(25.4%)	19917(24.8%)	0.99(0.964-1.017)
50th-75th	99558(23.2%)	16950(21.1%)	0.942(0.916-0.968)
75th-100	94710(22.1%)	12503(15.6%)	0.803(0.779-0.827)
Mortality	44589(10.1%)	13406(16.3%)	1.777(1.726-1.830)
Home discharge	200911(45.7%)	32596(39.7%)	Reference
Non home discharges	193886(44.1%)	36138(43.9%)	1.061(1.039-1.084)
Valve surgery	53807(12.2%)	7126(8.7%)	0.761(0.735-0.787)
Septic shock	53647(12.2%)	14432(17.5%)	1.47(1.42-1.522)
Intubation (>96hrs)	37460(8.5%)	8396(10.2%)	1.01(0.966-1.056)
Length of stay, Median, (IQR)	9(5-17)	11(6-19)	
Cost of stay, Median, (IQR) $	21348 (11216-45926)	25733(138476-51281)	

IQR = Interquartile range, COPD = Chronic obstructive pulmonary disease.
* Obesity = Body mass index >30.

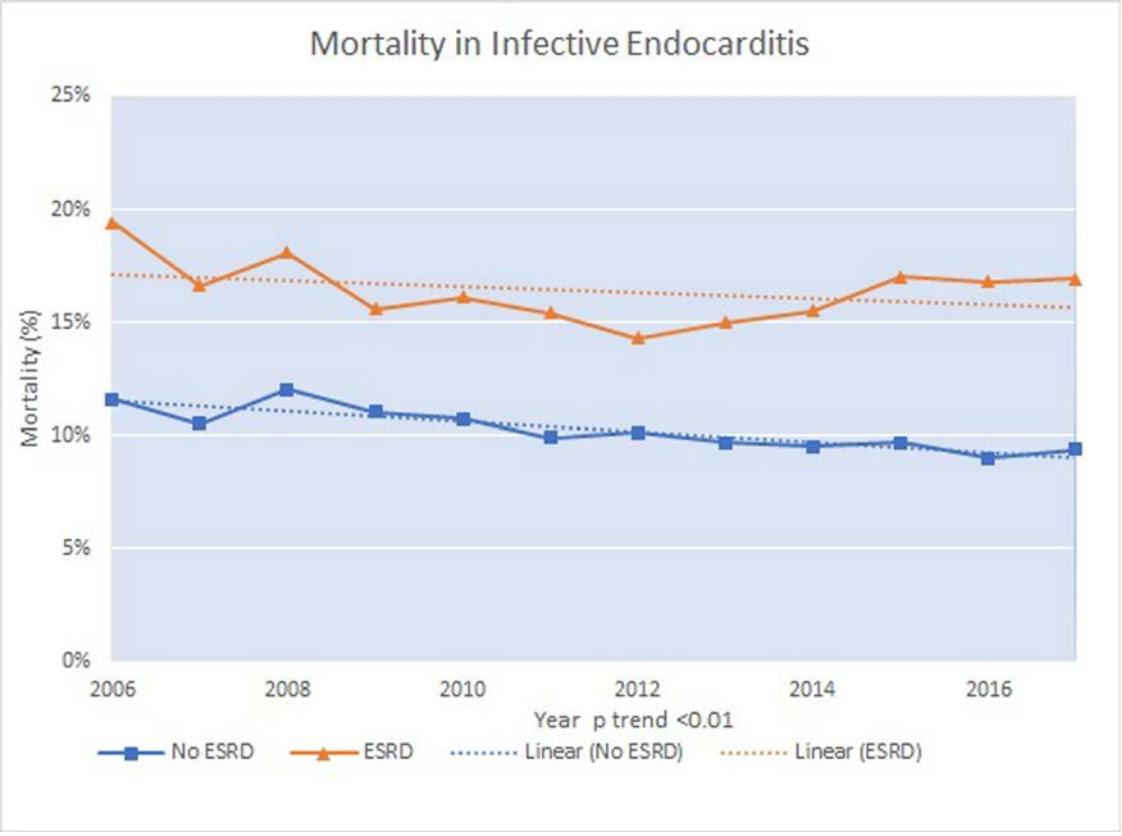

Figure 1. Trends in mortality in patient with and without ESRD.

Limitations of our study include - lack of proper validation studies of ICD codes for IE. Traditionally ESRD are sicker, although we did adjust for some comorbidities, adjustment for all known and unknown confounders in a retrospective analysis is not possible. NIS has the advantage of being a large database.

In conclusion, we noticed that mortality in IE with ESRD is decreasing, albeit slower than patient with no ESRD.

Disclosures

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Burden of Thrombotic Events in Coronavirus Disease-19 (COVID-19) Patients and Effect on Outcomes (from a Multicenter Electronic Health Record Database)

Coronavirus disease-19 (Covid-19) patients have been postulated to have high risk of thrombotic events (TE). There are variable estimates of the rate of TE with COVID-19 and derived from hospital case series mostly.[1,2] Data on unfavorable outcomes, including mortality in Covid-19 patients with TE are limited. We use a large electronic health record (EHR) database to investigate these questions.