

# Trends in Utilization, Mortality, and Major Complications After Left Ventricular Assist Device Implantation in the United States (2009-2014)

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## Introduction

- Continuous-flow LVADs account for 100% of implants for destination therapy (DT) since their approval by FDA in 2010 and more than 90% of all implants
- Technological advances, refinement of patient selection, improved surgical techniques and post-operative care, and increasing institutional experience may affect post-LVAD implantation outcomes overtime

## Methods

**Data Source:** National Inpatient Sample (NIS) of the Agency for Healthcare Research and Quality (2009-2014)

**Patient population:** ≥18 years with an LVAD (based on ICD-9 code 37.6)

**Covariates:** Patient- and hospital-level characteristics

**End Points:** In-hospital mortality and major complications (stroke, major post-operative bleeding, cardiac tamponade, post-operative infection, acute kidney injury requiring dialysis, wound dehiscence, hemolytic anemia, respiratory complications)

**Analysis:** i) Elixhauser index for comorbidities, ii) Poisson regression modeling with robust variance to calculate the average annual percentage change in admission and mortality, iii) mixed effects models for in-hospital outcomes.

## Results

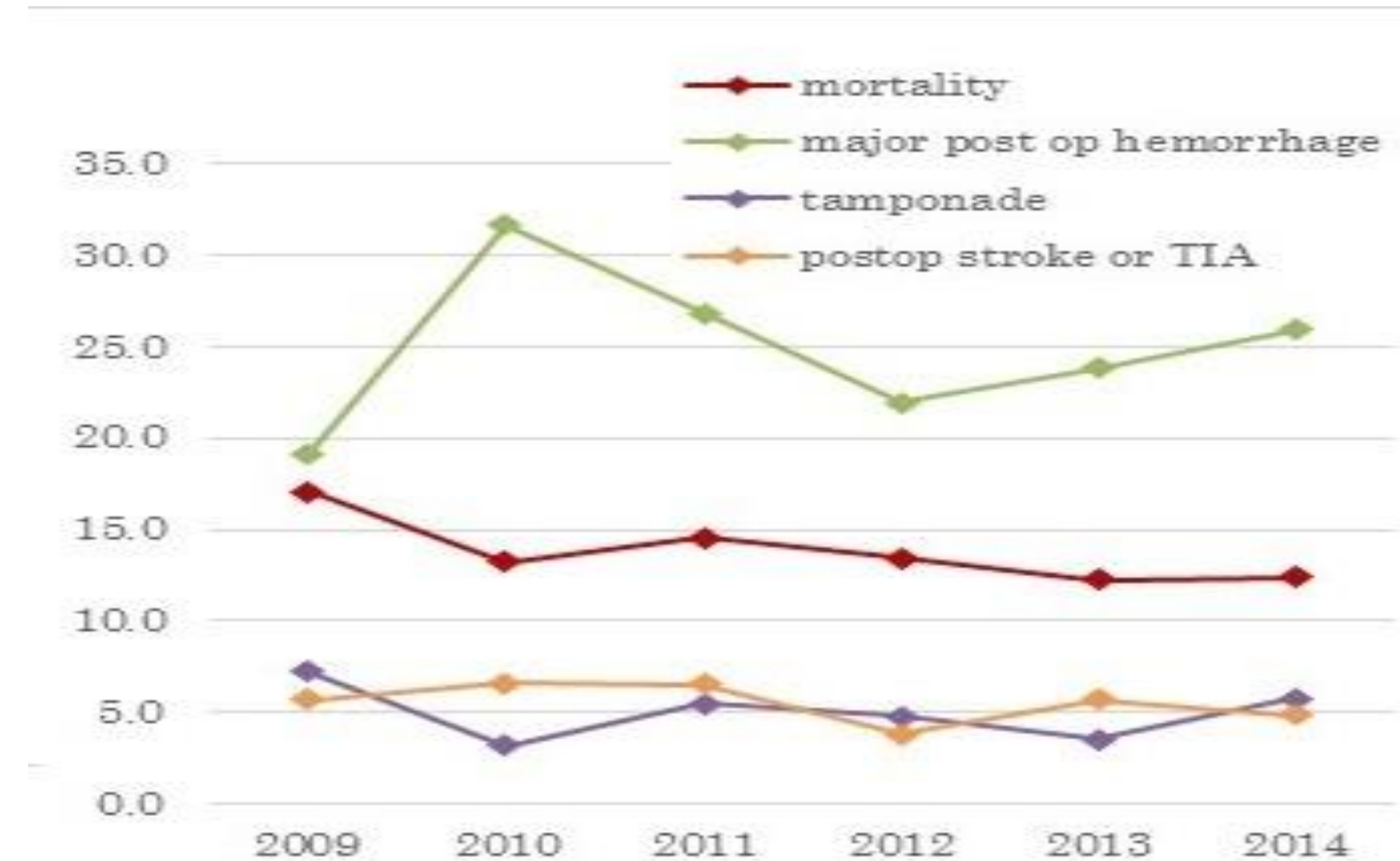
Trends in hospital outcomes among patients undergoing Left Ventricular Assist Devices implantation in the U.S

Variable	2009	2010	2011	2012	2013	2014	Average annual % change (p trend)
No. of patients (weighted)	2,155	2,386	2,590	3,120	3,505	3,795	+12.6 (p<0.001)
Mortality	17.1%	13.2%	14.5%	13.5%	12.3%	12.4%	-5.3 (p=0.02)
Major vascular complication*	6.1%	5.3%	6.2%	5.6%	7.3%	6.3%	+3.0 (p=0.40)
Major post op hemorrhage**	19.1%	31.6%	26.8%	22.0%	23.8%	26.0%	+1 (p=0.62)
Cardiac tamponade	7.2%	3.2%	5.5%	4.8%	3.6%	5.8%	-2.9 (p=0.51)
Perioperative cardiac arrest and nonfatal Myocardial Infarction	19.9%	14.9%	12.2%	13.6%	11.1%	12.8%	-8.1 (p=0.002)
Post op infection	27.15%	21.23%	23.23%	16.03%	16.55%	17.39%	-9.1 (p=0.001)
Postoperative stroke or Transient Ischemic Attack	5.74%	6.58%	6.56%	3.85%	5.71%	4.87%	-4.8 (p=0.33)
AKI requiring dialysis	5.74%	7.64%	7.98%	6.89%	5.28%	5.53%	-4.8 (0.25)
Wound dehiscence	1.55%	1.91%	1.06%	1.28%	1.71%	1.58%	+1 (p=0.82)
Hemolytic anemia	1.77%	0.21%	1.24%	1.44%	0.86%	1.84%	+7.5 (p=0.45)
Respiratory complication	7.7%	2.6%	3.5%	4.3%	2.7%	4.0%	-10.1 (p=0.03)
Nonroutine home discharge	70.93%	69.44%	67.15%	67.78%	70.52%	71.43%	+1.1 (p=0.14)
Cost, USD, median (IQR)	218170 (120880)	226991 (121156)	218581 (157077)	199718 (117146)	198636 (119661)	203405 (11896)	(P=0.001)
Length of stay, days, median (IQR)	35 (31)	27 (22)	29 (25)	28 (23)	28 (24)	29 (21)	(P=0.06)

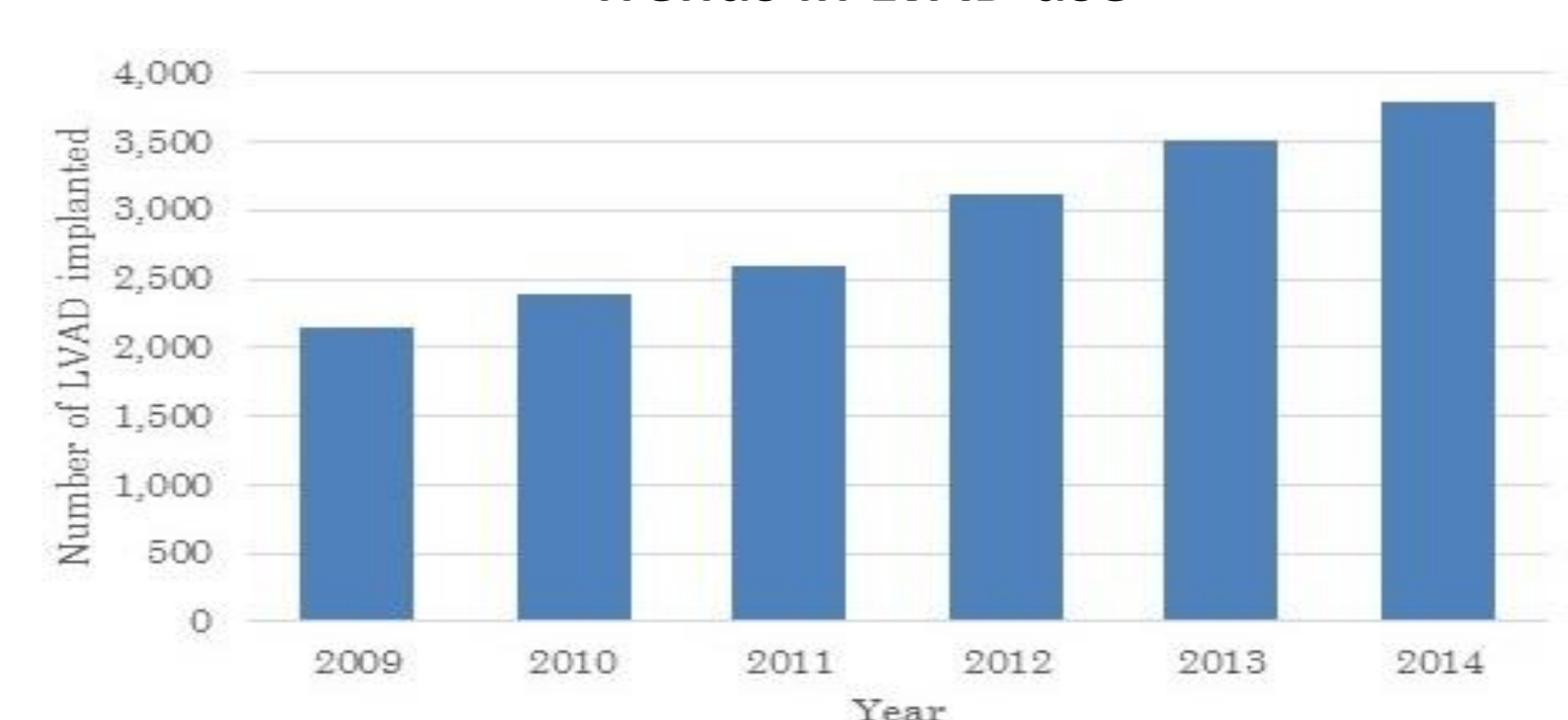
## Discussion

- LVAD utilization increased overtime with gradually increasing comorbidity burden of LVAD recipients
- In-hospital mortality rates decreased overtime
- Post-operative infections decrease overtime without significant changes in complication rates during the study period
- No significant differences in in-hospital mortality among geographical regions identified

Trends in main outcomes



Trends in LVAD use



Regional Variation of LVAD use

